

# **A Systems Critique of the Military Decision-Making Process at the Operational Level of War**

**A Monograph  
by  
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United States Army**



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## ABSTRACT

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The Military Decision Making Process (MDMP) is the U.S. Army's single analytical process used to assist the commander and staff in developing estimates and plans for military problem solving. A growing body of research and published works within and outside of the Army community are critical of MDMP as an ineffective means of planning and decision-making. Nonetheless, joint operational planning doctrine has adopted the principles of MDMP as the basis for operational planning and decision-making.

This monograph examines a revisionist account of *general systems theory* (GST) and proposes it as an alternative construct for future military-decision making at the operational level of war. This research rests upon Shimon Naveh's thesis in his *In Pursuit of Military Excellence*, which asserts that any methodological approach to warfare must be theoretically consistent with the materiel system conditions of warfare. Hence, "in those campaigns where a systemic approach was applied, in both the planning and management of armed forces, the nature of warfare was marked by sound operational logic..." This monograph seeks to answer the primary research question: Is a general systems theory approach to decision-making suitable for the operational level of war? This question is not only of academic interest but also indicative of calls for institutional change resulting from Army and DoD transformation initiatives.

A revisionist form of GST, or 'postmodern-GST,' is presented as a framework for military-decision making because of its socio-cultural implications and its value as a "potentially progressive and liberating" mode of thinking. The influences of other 20<sup>th</sup> century theories, namely structuralism, post structuralism, and critical theory are relevant because of their undeniable influence on GST and its revival as a postmodern epistemology. These influences must be examined in order to identify the implications that *a priori* or uncritically accepted warfare theory has on decision-making doctrine and institutional culture. Postmodern-GST, as a multidisciplinary and pluralistic mode of planning and decision-making, is exemplified by Peter Checkland's "Soft Systems Methodology" (SSM).

This monograph recommends a re-orientation of operational-level decision-making by considering SSM as an adaptive learning strategy that has the potential to replace or enhance current operational decision-making methods. An example of a systems based approach used in OIF planning is recommended for further study. This monograph's recommendations also imply reform in Army officer education, by systematic promotion of academic rigor, excellence, and graduate level education. This is necessary to balance the overwhelming influence of technological and information age theories of warfare that currently drive DoD/Army doctrine, force structure, and thinking.


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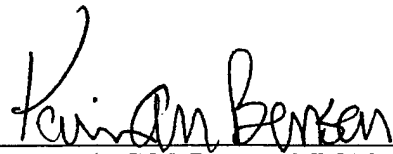
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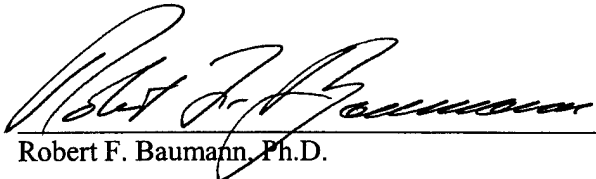
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A revisionist form of GST, or 'postmodern-GST,' is presented as a framework for military-decision making because of its socio-cultural implications and its value as a "potentially progressive and liberating" mode of thinking. The influences of other 20<sup>th</sup> century theories, namely structuralism, post structuralism, and critical theory are relevant because of their undeniable influence on GST and its revival as a postmodern epistemology. These influences must be examined in order to identify the implications that *a priori* or uncritically accepted warfare theory has on decision-making doctrine and institutional culture. Postmodern-GST, as a multidisciplinary and pluralistic mode of planning and decision-making, is exemplified by Peter Checkland's "Soft Systems Methodology" (SSM).

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# CHAPTER ONE: THE ARGUMENT

## INTRODUCTION: MODELS OF DECISION-MAKING

In the military domain, decision-making is often cast as a junction of art and science.<sup>1</sup> Western military theoreticians have consequently imbued decision-making with transcendental characteristics while parsing its logical foundations from the scope of physical, philosophical, moral, and mathematical examination. For early 19th century military theorists, though, it was not the fashion to separate the object of decision-making from the attributes and values of the decision-maker.<sup>2</sup> Nevertheless, decision-making is a habitual act conducted at times in complex and stressful situations with no immediate solutions available and at other times in an intuitive manner to the point of banality. Upon reflection, however, it is not always transparent on how a particular decision was reached, especially in group environments.

At the organizational level, the dissonance between decision act and abstraction become pronounced as decision-making is reified by the formalization of responsibility through bureaucratization and process. In the twentieth century, the preponderance of decision-making

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<sup>1</sup> For a doctrinal overview of decision-making in the abstract see, Department of the Army (DA) Field Manual (FM) 100-22, *Army Leadership*, 31 August 1999, paragraphs 2-51 (with respect to "judgment"), 4-33 (on ethical reasoning as art), 4-77 (on decision making as a component of the art of tactics), and 5-4 (on the Army concept of leadership as "both art and science"). (Hereafter, all DA FMs are referred to as FM x-x, *title*). On the "Art of Command," see FM 3-0, *Operations*, 14 June 2001, paragraphs 5-2, "Command remains a very personal function. As such, it is more an art than a science, although it exhibits characteristics of both," and 5-3. A rendering of planning as a form of decision-making is found in FM 5-0 *Army Planning and Orders Production (Final Draft)*, 15 July 2002, paragraph 1-49. For planning as a means to decision-making, see FM 5-0, chapter 1, "The Art of Planning," and paragraph 1-6, "The Science and Art of Planning." All field manuals unless otherwise noted are available electronically from the General Dennis J. Reimer Digital Library (See Bibliography under Internet Sources).

<sup>2</sup> Baron Antoine Henri de Jomini, *The Art of War*, (London: Greenhill Books, 1996), 55-57. For Jomini's normative approach (and disclaimer) to strategic *coup d'oeil*, see 337-345. Though in socio-cultural retrospect one may castigate Clausewitz's view of "Military Genius" as ethnocentric (e.g. civilized vs. primitive), Clausewitz goes further philosophically and theoretically by discerning the role of intellectual powers in relation to the various realms of war; i.e. danger, physical exertion, suffering, uncertainty, chance, through which are forged two "indispensable" attributes of military genius; *coup d'oeil* and determination. Carl Von Clausewitz, *On War*, Michael Howard and Peter Paret, eds. (Princeton: Princeton University Press, 1984), 101-104.

abstraction was left to the fields of economics and the behavioral sciences, but according to contemporary decision-theory literature and research, these fields failed to devise a satisfactory explanation of how people make decisions in organizations.<sup>3</sup> The primary source of that failure has been attributed to the dominance of the theoretical construct of *rational choice theory*.

The first decision-making theories to emerge from modern economics are generally described as *normative models* (hereafter referred to as *rational choice theory*). Rational choice theory (RCT), the offspring of economic theory and subsequently championed by the behavioral sciences, is prescriptive in nature commonly viewed within a classical economic context of “intelligent pursuit of self-interest” or “maximization of subjective expected utility.”<sup>4</sup>

Contextually, RCT logically posits itself as a superior decision-making methodology. RCT assumes that decision-makers,

...maximize return (or minimize loss); decisions are based upon unlimited information, and that decision makers have the capacity to use information efficiently; they know the options open to them and the consequences of pursuing one or another of those options; the optimal course of action is revealed by applying the appropriate analysis and choosing the most profitable option.<sup>5</sup>

Economist and Nobel laureate Amartya Sen views such characterization of RCT as “narrow” and “formulaic.”<sup>6</sup> Furthermore, oversimplification of how “rational choice” is defined and the wholesale disregard of other related values, such as the concept of freedom, contribute to the apparently easy dismissal of the underpinnings and implications of RCT. Such criticism has also migrated to business management literature in its questioning of “rationality” itself because

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<sup>3</sup> Lee Roy Beach, ed., *Image Theory: Theoretical and Empirical Foundations*, (Mahwah, NJ: Lawrence Erlbaum Associates, Inc., 1998), ix; Gary Klein, “Strategies of Decision Making,” *Military Review*, (May 1989): 56-64, and Gary Klein, *Intuition at Work*, (New York: Double Day, 2002), 10-11.

<sup>4</sup> Ibid. For a recent scholarly work examining RCT in detail see Amartya Sen, *Rationality and Freedom*, (Cambridge, MA: Belknap Press, 2002), 4, 26-33, 46-47.

<sup>5</sup> Ibid., ix.

<sup>6</sup> Sen, *Rationality and Freedom*, 4, 6, 19-26. Many economists themselves hold a view characterized by “narrow assumptions about self interest” that some highly regarded economists (Amartya Sen, Kenneth Arrow, Gary Becker) do not espouse. Gary S. Becker, “The Economic Way of Looking at Life,” *Nobel Lecture, Economic Sciences 1992*, 9 December 1992, 38 [lecture online]; available from the *Nobel e-Museum*, “Gary S. Becker Prize Lecture,” <http://www.nobel.se/economics/laureates/1992/becker-lecture.pdf>, accessed 5 February 2004.

of the term's common conceptual misuse and mechanistic heritage.<sup>7</sup> Also contributing to the visceral rejection of rationality-based constructs and theory are post-modern criticisms that rebuke any "totalizing" schemes or "meta-narratives" for their presumed transmutability into totalitarian ideologies, engineered social frameworks, and varied forms of instrumentalism.<sup>8</sup> These orthodox views and critical assessments of RCT form the background of the ascent of "intuitive" decision making methods.

Empirical research and common sense show that RCT's generally accepted assumptions are not attainable or realizable in practice. Contemporary research on decision theory, focused upon descriptive methodologies, brought forth an alternative model called *naturalistic decision theory*. Research in naturalistic decision theory has substantiated that, in practice, people habitually consider single courses of action rather than many and that few decisions involve rigorous cost-benefit analyses or probabilistic thinking.<sup>9</sup> The compelling argument for naturalistic decision theory, in contrast with RCT, has more to do with empirical evidence of how experts actually make decisions rather than *prescribing* how people should make decisions. Another important research finding, consistent with the revisionist interpretation of RCT, is that individual and organizational values have more import upon decision-making (in an

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<sup>7</sup>Henry Mintzberg, *The Rise and Fall of Strategic Planning*, (New York: The Free Press, 1994), 13. Mintzberg writes, "...formal *rationality* permeates the literature of planning." [emphasis in the original] "Rationality of this formal kind is, of course, rooted in analysis, not synthesis...reducing states and processes to their component parts." "[Reductionism]...underlies some of the most important thinking in the field of planning, and has proved to be patently false."

<sup>8</sup>David Harvey, *The Condition of Postmodernity*, (Cambridge, MA: Blackwell Publishers, 1990), 7-9. Another examination of the modern to postmodern shift (and the destructiveness of utopianism to fragmented worldviews) is captured in the late Isaiah Berlin's study of Russian 19<sup>th</sup> century intellectuals, in particular Alexander Herzen. Isaiah Berlin, *Russian Thinkers*, (New York: The Viking Press, 1978).

<sup>9</sup>Henry Mintzberg, "The Manager's Job: Folklore and Fact," *Harvard Business Review*, (July/August 1975): 49-61 as cited in Beach, 4. A recent counter example (extolling probabilistic decision-making) that describes executive-level probabilistic decision making in action is found in Robert E. Rubin and Jacob Weisberg's, *In an Uncertain World, Tough Choices from Wall Street to Washington*, (New York: Random House, 2003).

organizational context) than pure economic interests or analytical dogma.<sup>10</sup> This latter evidence is also consistent with the ideas and the significance of values by which 19<sup>th</sup> century military theorists characterized effective military decision-making.

## THE MILITARY DECISION MAKING PROCESS AND TRANSFORMATION

The Military Decision Making Process (MDMP) is the U.S. Army's doctrinally approved tactical problem solving process. Commanders and staffs use the MDMP to "develop estimates, plans, and orders" in order to visualize the battlefield and "reach logical decisions."<sup>11</sup> However, a growing body of research and published works within and outside the Army community is critical of the MDMP as an ineffective means of planning and decision-making.<sup>12</sup> Specifically, naturalistic decision-making theorists claim that experienced and competent problem solvers do not, in practice, 'rationally' choose between distinct courses of action, but rather rely on an

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<sup>10</sup> T. Peters, "Leadership: Sad Facts and Silver Linings," *Harvard Business Review*, (November/December 1979): 164-172 and G. Donaldson and J.W. Lorsch, *Decision Making at the Top: The Shaping of Strategic Direction*, (New York: Basic Books, 1983), as cited in Beach, 5.

<sup>11</sup> FM 101-5, *Staff Organization and Operations*, 31 May 1997, pg. 5-1 and FM 3-0, *Operations*, 14 June 2001, pg. 6-4. FM 5-0 and FM 6-0, *Mission Command: Command and Control of Army Forces*, 11 August 2003, together will replace FM 101-5. Because FM 5-0 has not been approved for formal publication (while FM 6-0 is approved), FM 101-5 remains "current doctrine." Nonetheless, FM 5-0 states that the Army uses "...three different, but related processes to guide planning activities: Army problem solving, MDMP, and Troop Leading Procedures (TLP).

<sup>12</sup> Wilson A Shoffner, *The Military Decision-Making Process: Time For a Change*. (Fort Leavenworth, KS: U.S. Army Command and General Staff College (CGSC), 2000), ii and chapter III for the "Shortcomings of MDMP." For the "Theoretical and Practical Limitations of the MDMP," see John W. Charlton, *Digitized Chaos: Is Our Military Decision Making Process Ready for the Information Age?* (Fort Leavenworth, KS: USCGSC, 1997), 10-19. Tedd A. Wheeler, *Operational Art – Leveraging Information Technology*, (Fort Leavenworth, KS: USCGSC, 2000), 17. The leading critic of rational choice methodologies such as MDMP is Dr. Gary Klein of Klein Associates Inc. See Klein's "Strategies of Decision Making," *Military Review*, (May 1989): 56-64. See also John F. Schmitt and Gary Klein, "How We Plan," *Marine Corps Gazette* Vol. 83, Issue 10, (October 1999): 18-26. A comprehensive list of Klein Associates' research is available [online] from, [http://www.decisionmaking.com/KA\\_Pubs\\_102700.pdf](http://www.decisionmaking.com/KA_Pubs_102700.pdf). Other works citing conclusive evidence of the efficacy of naturalistic decision-making include Peter Thunholm, "An Attempt Toward a Prescriptive Model of Military Tactical Decision-Making," from the 5<sup>th</sup> *Conference on Naturalistic Decision Making, Tammsvik, Sweden, May 26-28, 2000*; Lawrence G. Shattuck, "A Proposal for Designing Cognitive Aids for Commanders in the 21<sup>st</sup> Century," in *Future Leadership, Old Issues, New Methods*, Douglas V. Johnson II, ed., (Carlisle, PA: U.S. Army War College, 2000), 101-124. Works favorably assessing MDMP include Joseph S. McLamb's, "Is it Time to Abandon the Military Decisionmaking Process?" *Military Review*, (March-April 2002): 98-102.

intuitive choice methodology based upon pattern recognition gained through accumulated experience.<sup>13</sup> Adherents of MDMP counter that naturalistic decision-making is a narrow application of decision-making employed in less complex occupations and environments.

The methodological debate between military decision-making schools of thought, however, is not only of academic interest. The principal reason forcing the Army to reassess its decision making methods and doctrine is the call for institutional change concomitant with Army and Department of Defense (DoD) transformation initiatives.<sup>14</sup> DoD bases its transformation policy on the concept that, "The United States is transitioning from an industrial age to an information age military," and thus must reconsider how the institution operates, how it is structured, and how its processes contribute to its primary mission of warfighting.<sup>15</sup> Both DoD and Army transformation initiatives seek to resolve the cognitive, physical, and cultural implications of twenty-first century warfare through reform in the areas of organization, leadership, training, and joint education.<sup>16</sup> Assessments of recent combat operations in Iraq and

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<sup>13</sup> Gary Klein, *Sources of Power*, (Cambridge, MA: The MIT Press, 1998) xiii-xvi; and idem, *Intuition at Work*, (New York: Random House, 2003), 15-19.

<sup>14</sup> Sean D. Naylor, "Total Transformation: Objective Force planner says changes in manning, decision-making must accompany new technology," *Army Times*, January 6, 2003, p. 8; Department of the Army, *United States Army White Paper: Concepts for the Objective Force*, (Washington DC: Department of the Army, 1999), 7-8 (hereafter referred to as the *Army White Paper*). Decision-making attributes required for tactical success in the Objective Force are described within the qualities of *Understand First* and *Act First*. One may conclude that these decision-making traits are similarly required at the operational level, since that level also conforms to the "Quality of Firsts" construct.

<sup>15</sup> Department of Defense, *Transformation Planning Guidance*, (Office of the Secretary of Defense, April 2003), 3 (hereafter referred to as the *DoD TPG*). Moreover, DoD's transformation planning guidance rests upon the articulation of "joint warfighting concepts" and a functional approach to adjudicating capabilities through a, "...full range of supporting military capability areas: doctrine, organization, training, materiel, leadership and education, personnel and facilities."; *Army White Paper*, 3; and Department of Defense, *Quadrennial Defense Review Report*, (Washington, D.C: 30 September 2001), 21-32. The 2001 QDR is available in electronic form from the *DefenseLink Publications Archive* at <http://www.defenselink.mil/pubs/archive.html>, accessed 19 January 2004.

<sup>16</sup> *Army White Paper*, 19. "Leaders will be educated for rapid tactical decision making - - this means changing from plan-centric to intent-centric operations; changing from physical rehearsals to virtual rehearsals; and changing from static command posts to command and control on the move."; *DoD TPG*, 8, 20-21; Department of the Army, *The Way Ahead*, (Army Strategic Communications, Room 3B548, Pentagon, Washington, D.C., 2003), 3, 8-9. At the tactical level, the "[Army]...will focus the training center experience on execution and not overly emphasize the deliberate planning process."

Afghanistan have revealed the need to focus upon the individual and organizational characteristics required for successful decision-making at the tactical, operational, and strategic levels of war.

Documents for implementation of Army transformation explicitly address the need for force structure and doctrinal change at the tactical level of organizational processes such as MDMP. An example is the U.S. Army Training and Doctrine Command's (TRADOC) Pamphlet 525-3-90, *The United States Army Objective Force Operational and Organizational Plan Maneuver Unit of Action, [Final]*:

The operational concept of the UA will require a revolutionary change to the current Military Decision Making Process (MDMP) to account for the tempo of operations and better execution. The current staff structure, stovepiped by BOS and integrated by a series of meetings in the TOC, must evolve to one of more effective groupings of subject matter experts.<sup>17</sup>

In other words, the projected attributes and characteristics of *Future Force*<sup>18</sup> commanders and staffs warrant change to standing military decision-making process doctrine. Transformation notwithstanding, change to doctrinal decision-making procedure has not kept pace in spite of the Army's use of 'electronic libraries.' The MDMP procedure found in the recently published *FM 5.0, Army Planning and Orders Production (Final Draft)* remains procedurally unchanged from its earlier form found in FM 101-5 though FM 5-0 describes intuitive decision making. FM 5-0 addresses the pros and cons of intuitive vs. analytical decision-making within "the decision making continuum."<sup>19</sup>

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<sup>17</sup> Change 2 to TRADOC Pamphlet 525-3-90 O&O, *The United States Army Objective Force Operational and Organizational Plan Maneuver Unit of Action, [Final]*, (Prepared by the Unit of Action Maneuver Battle Lab, Fort Knox, KY 40121, 30 June 2003), pg. 4-22.

<sup>18</sup> The 2003 published draft of the *Army Transformation Roadmap (ATR)* has semantically changed the Army's transformation structure from the *Legacy-Interim-Objective Force* to *Current and Future Force*. *Army Transformation Roadmap 2003* (Pre-decisional Draft), Army Transformation Office, coordinating draft as of 22 September 2003.

<sup>19</sup> FM 5-0, paragraphs 1-54 to 1-59. See figure 1-4, "The Decision Making Continuum," page 1-14 describes the relative effectiveness of intuitive and analytical decision making as a function of time and process.

Dr. Gary Klein of Klein Associates, Inc., a leading contributor to research and publishing in the naturalistic decision-making field, is proposing further study of his firm's naturalistic decision-making technique, the Recognitional Planning Model (RPM), as a possible future tactical planning method for the Army's Objective Force Units of Action (UA). The abstract of Klein's RPM proposal concludes that, "...the RPM warrants additional research as a potential planning approach for the Objective Force."<sup>20</sup> Although Klein's work concentrates at the tactical level, the corpus of his written work and research certainly implies the value of Recognition Primed Decision-Making (RPD) technique at levels beyond the tactical realm.

At the operational and strategic levels, the intellectual and theoretical foundations for transformation itself have come under pointed criticism in light of operations unfolding in Iraq and Afghanistan.<sup>21</sup> Though the debate over the meaning and intellectual history of military innovation or Revolutions of Military Affairs (RMA) has been the subject of historical research in the West since the mid-1950s, military historians and Army insiders have accused both the DoD and Army leadership of poor to nonexistent intellectual and historical rigor.<sup>22</sup> The transformation literature and subsequent force structure changes that have resulted presume that

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<sup>20</sup> Karol G. Ross, Gary Klein, Peter Thunholm, John F. Schmitt, Holly Baxter, *The Recognitional Planning Model: Application for the Objective Force Unit of Action (UA)*, Klein Associates Inc. Fairborn, OH. Document prepared in collaboration with the Advanced Decision Architectures Consortium sponsored by the U.S. Army Research Laboratory under the Collaborative Technology Alliance Program, Cooperative Agreement DAAD19-01-2-0009, 1.

<sup>21</sup> The list of works critical of the strategy and execution of Operation Iraqi Freedom (OIF) grows daily. However, the majority of articles are editorial in nature, but some notable exceptions include Frederick W. Kagan, "War and Aftermath," *Policy Review*. Number 120, (August & September 2003). Though not a critique of Army transformation, an even handed account detailing the realities of when insurgency theory meets practice, during OIF is found in Peter Maass', "Professor Nagl's War," *The New York Times Magazine*, January 11, 2004.

<sup>22</sup> MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution, 1300-2050*, (Cambridge: Cambridge University Press, 2001), 1-5; John A. Gentry, "Doomed to Fail: America's Blind Faith in Military Technology," *Parameters*, (Winter 2002-03): 88-103; A thoroughly documented and powerful critique against the assumptions of Army transformation is found in H.R. McMasters, "Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War," *Center for Strategic Leadership Student Issue Paper* Volume S03-03 (Carlisle, PA: U.S. Army War College, November 2003).



the nature of warfare conforms to the characteristics of "information-age" theories of warfare. Given that theoretical premises such as "network centric warfare" and "information dominance" are used to validate material research and development and force structure changes, the evidence is clear that an *a priori* definition of the nature of conflict drives the context and the perceived need for institutional, cultural, and doctrinal change.

The dilemma for Army transformation efforts is two-fold: (1) If the underlying premises of conflict are incorrect, then it follows that Army transformation initiatives, such as 'revolutionizing' MDMP, may be either fundamentally flawed or at least misdirected. (2) If the theoretical premises underlying Army transformation are correct, then what type of change is theoretically and *in practice* appropriate for *Future Force* commanders and staffs? The Army institutional and doctrinal view of the nature of war (or theory of conflict) is absolutely germane to institutional reform(s), such as changing the MDMP. This study does not assume that the theoretical assumptions of Army transformation are beyond critical evaluation themselves.

## RESEARCH METHODOLOGY

The framework and scope of this study are the theoretical implications of doctrinal change in deliberate MDMP at the operational level of war.<sup>23</sup> This monograph's conclusions focus on the operational level but touch also upon other doctrinally accepted levels of decision-

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<sup>23</sup> The term "operational level of war" is taken from the Department of Defense's *Joint Encyclopedia* definition of the term. "The level of war at which campaigns and major operations are planned, conducted, and sustained to accomplish strategic objectives within theaters or areas of operations. Activities at this level link tactics and strategy by establishing operational objectives needed to accomplish the strategic objectives, sequencing events to achieve the operational objectives, initiating actions, and applying resources to bring about and sustain these events. These activities imply a broader dimension of time or space than do tactics; they ensure the logistic and administrative support of tactical forces, and provide the means by which tactical successes are exploited to achieve strategic objectives." Department of Defense, *Joint Doctrine Encyclopedia*, 16 July 1997, 564. Unless stated otherwise, all Joint Publications (JP) are available from the *Joint Electronic Library (JEL)* (See bibliography under Internet Sources).

making. The primary research question is: Is a general systems theory approach to decision-making suitable for the operational level of war?

The primary research question is derived from Shimon Naveh's thesis in his *In Pursuit of Military Excellence*, which asserts,

...that for the first time since the French Revolution the phenomenon of war in general and the domain of military operations in particular, have been characterized by the existence of materiel system conditions; hence their study must comply with a systematic approach and their examination must be conducted in accordance with systemic criteria.<sup>24</sup>

A corollary to this premise is that any methodological approach to warfare must be theoretically consistent with the materiel system conditions (or *a priori* nature) of warfare. Hence, "in those campaigns where a systemic approach was applied, in both the planning and management of armed forces, the nature of warfare was marked by sound operational logic..."<sup>25</sup> Naveh's thesis of the evolution of operational theory and cognition serve to underpin the historical significance of the relationship between the nature of warfare, the problem of theory, and the significance of theoretically consonant problem cognition. Moreover, this monograph examines the relationship between decision-making models and any problem solving methodology's first essential question: What is the nature of the problem?

Identifying the nature of conflict begs meta-theoretical and political concerns immediately, whose discussion is ultimately beyond the scope of this paper but is nonetheless considered here. This study's general assumption about the nature of war is based upon the Clausewitzian axiom on the primacy of policy in warfare. This is further elaborated within an Army and joint operational context of the doctrinal imperative of defining the military "end state." Henry Kissinger, former Secretary of State for Presidents Nixon and Ford, drawing on lessons learned from the Vietnam War, amplifies the imperative of understanding the nature of conflict *prior to* the commitment of military power,

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<sup>24</sup> Shimon Naveh, *In Pursuit of Military Excellence*, (Portland: Frank Cass Publishers, 2000), xiii.

<sup>25</sup> *Ibid.*, xiii.

First, before the United States commits itself to combat, it should have a clear understanding of the nature of the threat it will be confronting and of the objectives it can realistically reach. It must have a clear military strategy and an unambiguous definition of what constitutes a successful political outcome.<sup>26</sup>

Kissinger's statement, though politically and historically idealistic, echoes throughout joint and army operational doctrine. In planning joint operations, defining the desired end state is the "the critical first step in the estimate and planning process."<sup>27</sup> This research examines a general systems theory based approach to decision-making with respect to understanding the nature of the "problem", i.e., in the context of a theory of conflict.

By analyzing the theoretical and methodological foundations of systems-based decision-making method this study will answer the primary research question. If the Naveh corollary is true, then a theoretically consonant problem solving method renders moot methodological difference. Put another way, if theoretical consistency is sufficient but not necessary, then a systems based approach is suitable for solving future military problems. If theoretical consistency is necessary between the problem solving model and the specific problem in practice, then the methodological debate has no validity as an "either/or" proposition. Thus, the value of a problem-solving analytical device may not lie with technique itself, but with theoretical consistency with the nature of the 'problem.'<sup>28</sup>

The criteria of this analysis focus upon the operational level of warfare and the projected needs of the Army's *Future Force* but are not wholly derivative upon Army transformation assumptions. These criteria avoid the assumptions upon which *Future Force* capabilities are dependent, namely the intellectual foundations of Army and DoD transformation as discussed above. The use of doctrinally meaningful criteria is resolved by weighing them against their

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<sup>26</sup> Henry Kissinger, *Diplomacy*, (New York: Simon and Schuster, 1994), 700.

<sup>27</sup> Department of Defense (DoD) Joint Publication (JP) 3-0, *Doctrine for Joint Operations*, 10 September 2001, page III-2.

<sup>28</sup> Ironically, if theoretical consistency is judged *a priori* superior then does this formulation serve to promote contextual ideology or instrumentalism in the name of critical inquiry?

relevance to Army and joint operational planning concepts. These doctrinal concepts are *Battle Command*, *Battlefield Visualization*, and *Operational Planning*.<sup>29</sup> The criteria are:

(1) *Problem Definition*: Does general systems theory demonstrate whether a decision making model is more suitable for identifying an adversary's political aim (or purpose) and for differentiating that from the methods by which the adversary sets out to achieve his aim? In other words, can it be determined whether a decision model is more suitable to identify and differentiate between an adversary's *raison d'être* and the modalities (or tactics) by which it seeks to achieve its stated or unstated aims?<sup>30</sup> If the answer to this question is yes, then the primary research question is answered. If a decision model can systematically define problems and differentiate them from their modalities, then that model may be more adaptable under conditions of uncertainty and/or complexity (see criterion #3 below).

Based upon the aforementioned Naveh corollary, such a decision-making model must be theoretically consonant with the presupposed nature of conflict. However, theoretical consonance may indicate inherent weakness (e.g., if a model is contextually dependent upon an *a priori* nature of conflict, then that model might be susceptible to unsuccessful outcomes when the

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<sup>29</sup> FM 3-0, *Operations*, chapters 5 and 6 for the definition of Army planning at the operational and tactical levels. For an overview of military and joint planning see JP 5-0, *Doctrine for Planning Joint Operations*, 13 April 1995, chapter I (note distinction between force planning and joint operation planning. This monograph is concerned with the latter). JP 5-0, pg I-2 states, "Joint operation planning at the operational level links the tactical employment of forces to strategic objectives. The focus at this level is on operational art--the employment of military forces to attain strategic and/or operational objectives through the design, organization, integration, and conduct of strategies, campaigns, major operations, and battles." The revised 2d draft of JP 5-0, dated 12 December 2002, describes four types of military planning; Joint Strategic Planning, Theater Security Cooperation Planning, Joint Operation Planning, and Force Planning. [As of February 2004, the 2d draft JP 5-0 was not available on the JEL]. JP 5-00.2, *Joint Task Force Planning Guidance and Procedures*, 13 January 1999, chapter IX, section B. (Joint Task Force Planning) discusses the concepts and recommended organizational structures for the conduct of joint task force (JTF) level deliberate and crisis action planning.

<sup>30</sup> See Naveh, 4-7. This criterion is derivative of Naveh's concept of the dichotomy between a system's abstract and the mechanistic constituents that is the "crucial condition for the functioning of consciousness-driven systems." Ibid., 6. Naveh introduces Ludwig von Bertalanffy's "cognitive tools for criticizing and analyzing systems" within an operational setting. See Bard O'Neill, *Insurgency & Terrorism*, for his discussion on the problems of identifying insurgencies with respect to: Goal Transformation, Goal Conflicts, Misleading Rhetoric and Goal Ambiguity. Bard E. O'Neill, *Insurgency & Terrorism: Inside Modern Revolutionary Warfare*, (Dulles, VA: Brassey's, 1990), 21-23.

conditions or nature of conflict change). Changes in fundamental externalities notwithstanding, the secondary question is that if a model is "externally consistent," then it may be a suitable decision-making methodology under conditions of uncertainty. Doctrinally, this criterion is relevant to battlefield visualization in the effectiveness by which political ends, operational ways, and tactical means are integrated.<sup>31</sup>

(2) *Synthesis*: Does general systems theory sufficiently demonstrate whether a decision-making model allows for a multi-disciplinary and integrative (or collaborative) decision-making approach, conducive to synthesizing complex information and knowledge inputs? If the answer is yes, then the primary research question is answered. If a model is advantageous in collaborative decision-making or planning, then it may be a suitable decision-making candidate for the operational level of war. The quality of collaboration and synthesis are critical to a commander's ability to adequately visualize the overall operation and determine a "desired outcome."<sup>32</sup>

(3) *Adaptability/Learning*: Does general systems theory demonstrate whether a decision-making methodology allows decision-maker(s) to make effective decisions in varied situations and environments? To what degree does a method account for complex and adaptive adversaries and allow decision-makers and organizations to learn from experience and information? This criterion is related to the secondary question of criterion #1 above. A model may be more suitable under conditions of uncertainty or unpredictability if it allows the decision-maker to account for an adversary's freedom of action and does not depend upon information predicated upon notions such as achieving "near perfect intelligence." Such a method might produce a

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<sup>31</sup> FM 5-0, paragraph 3-13 (Elements of Operational Design), FM 3-0, paragraphs 2-11 (Operational art), 4-35 (Objective), 4-36 (Objective), 5-23 (Elements of Operational Design).

<sup>32</sup> FM 3-0, pgs. 5-2 to 5-13. See FM 5-0, paragraphs 1-80 through 1-82 for a doctrinal description of collaborative planning.

decision-making climate that is less prone to risk-averse choices based upon incomplete information.

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Though this monograph is concerned with general systems theory and operational decision-making, the validity of employing a "systems approach" as a heuristic tool must be assessed to provide context to the debate over the future of military decision-making doctrine. Hence, an interpretation of systems theory's intellectual antecedents and history is necessary. The next chapter is devoted to the background and shape of the intellectual tradition known as "general systems theory."

## CHAPTER TWO: HISTORY, CRITICISM, AND METHOD<sup>33</sup>

### A BRIEF HISTORY OF GENERAL SYSTEMS THEORY

While the concept of *system* is not a strictly twentieth century invention, the meaning and implications of the terms *systems theory*, *systems approach*, *systems thinking*, and *general systems theory* (GST) are. These terms are twentieth century concatenates, subject to varied interpretation as will be shown. Systems theory, systems thinking, and GST are often portrayed as the science of “integrated and coherent phenomena” but their historical development displays divergent and at times conflicting orientations not only epistemologically but ideologically as well.<sup>34</sup> Consequently many academic disciplines use or disabuse *systems theory* et al. as a conceptual aid to comprehending and describing physical and social phenomena. Generic definitions of systems theory’s fundamental expressions, such as the examples by Professor George J. Klir below, appear contextually neutral:

General systems theory in the broadest sense refers to a collection of general concepts, principles, tools, problems, methods, and techniques associated with systems...

[System]...ordinarily stands for an arrangement of certain components so interrelated as to form a whole. Diverse types of components and their interrelations represent different systems. ...<sup>35</sup>

A mathematical definition tells us even less,

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<sup>33</sup> This chapter draws on the research of Deborah Hammond, “Toward a Science of Synthesis: The Heritage of General Systems Theory,” (Ph.D. diss., University of California, Berkeley, 1997). Hammond is currently provost and professor of interdisciplinary studies at Sonoma State University, California.

<sup>34</sup> Deborah Hammond, “Exploring the Genealogy of Systems Thinking,” in *Systems Research and Behavioral Science* 19 (Sep/Oct 2002): 429. Systems thinking and GST’s multivalent and divergent characterization are a common theme in the introductory and secondary literature; George J. Klir, “Preview: The Polyphonic General Systems Theory” in George J. Klir, ed., *Trends in General Systems Theory*, (New York: John Wiley & Sons, 1972), 1 (hereafter referred to as *Preview*); Anatol Rapoport, *General Systems Theory*, (Cambridge, MA: Abacus, 1986), 1; Nic J.T.A. Kramer and Jacob de Smit, *Systems Thinking: Concepts and Notions*, (Leiden: Martinus Nijhoff, 1977), v.

<sup>35</sup> Klir further clarifies the context of general systems theory qua theory. “Strictly speaking, general systems theory (in the widest usage of the term) is not a theory in the formal sense (an axiomatic theory), although it embodies some formal theories... [It] is often considered to contain various concepts, hypotheses, methodological principles, computer techniques, and other particulars which do not belong to any formal theory.” Klir, *Preview*, 3.

...a set of differential equations that describe the relationships between different variables, which can be solved and particular values maximized or minimized...<sup>36</sup>

Since mere definitions show the inadequacy of synchronic textual analysis, the tools of historiography need to be employed.

From the vantage point of the history of science, the emergence of GST, whose creation is attributed to the late theoretical biologist Ludwig von Bertalanffy, marks an epistemological shift from the Newtonian scientific worldview and "classical" reductionist methods of inquiry.<sup>37</sup> In "The History and Status of General Systems Theory," Bertalanffy interprets the chronology of systems thinking as a developmental path within greater Western thought. With its initial appearance in Aristotle's holistic and teleological questions of *Being*, Bertalanffy contends that the historical context of the "basic systems problem" begins with the Aristotelian assertion, "The whole is more than the sum of its parts."<sup>38</sup> Bertalanffy describes GST as the articulation of this epistemological conundrum throughout history. Although modern science eventually eclipsed Aristotle's teleology, problems such as the meaning of "the order and goal-directedness of living systems" were overlooked rather than solved.<sup>39</sup>

Bertalanffy's ontology of systems thinking appears Heideggerian (as to *the question of the meaning of Being*). Its origins can be traced from ancient Greek philosophy, reappearing in

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<sup>36</sup> Deborah Hammond, "Toward a Science of Synthesis: The Heritage of General Systems Theory," (Ph.D. diss., University of California, Berkeley, 1997), 18 (hereafter referred to as *Synthesis*).

<sup>37</sup> Ibid., 111. Hammond, notes, "Bertalanffy is generally acknowledged as the founder of GST, although, as is common in the history of science, his priority has been disputed."

<sup>38</sup> Ludwig von Bertalanffy, "The History and Status of General Systems Theory," (hereafter referred to as *History*) in Klir, ed., *Trends in General Systems Theory*, 21-22.

<sup>39</sup> Ibid., 22; See also Hammond, *Synthesis*, 13. Hammond stresses the fundamental duality inherent in systems thinking; that of dynamic interaction versus the concern with order. In offering the viewpoint of University of California, Berkeley professor emeritus of business C. West Churchman who, "...identifies the *I Ching* as the oldest systems approach..." Hammond juxtaposes these dual "systems" approaches—those analogous of the *I Ching*—with those of the West: "As an effort to model dynamic processes of changing relationships between different kinds of elements, it [*I Ching*] can be seen as a *systemic* view, in contrast with the more *systematic* approach of rationalist Western thought, rooted in the work of Plato and Aristotle...this contrast between systemic conceptions which focus on interrelationships and dynamic processes, and the systematic conceptions which are more concerned with order, is critical in understanding the relationship between different views of systems in the twentieth century." [emphases in the original]



Medieval Christian mysticism, the sixteenth-seventeenth century scientific revolution, Cartesian rationalism, Leibniz's monadism, Hegelian philosophy, and even in the works of Karl Marx among others.<sup>40</sup> In the late 1920s, it was Bertalanffy himself who bestowed systems thinking with its twentieth-century *Gestalt* by introducing an *organismic* model from the biological sciences:

Since the fundamental character of the living thing is its organization, the customary investigation of the single parts and processes cannot provide a complete explanation of the vital phenomena. This investigation gives us no information about the coordination of parts and processes. Thus the chief task of biology must be to discover the laws of biological systems (at all levels of organization). We believe that the attempts to find a foundation for theoretical biology point at a fundamental change in the world picture. This view, considered as a method of investigation we shall call "*organismic biology*" and, as an attempt at an explanation, "*the system theory of the organism*."<sup>41</sup>

Bertalanffy's systems model was the vanguard of biology's organismic movement that included many other scientists engaged by questions posed by evolutionary theory, life growth processes, and the "relationship between biological/psychological and physical/chemical phenomena."

When interpreted from a philosophy of history narrative, organismic biology served as a new

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<sup>40</sup> Bertalanffy, *History*, 24-25.

<sup>41</sup> Quoted in Bertalanffy, *History*, 24-25, [Emphasis in the original]. This work was originally published in German, in *Kritische Theorie der Formbildung* (Berlin: Borntraeger, 1928), and translated into English under *Modern Theories of Development*, J.H. Woodger trans., (Oxford: Oxford University Press, 1934). Bertalanffy adds that as his ideas were "Recognized 'as something new in biological literature,' the organismic program became widely accepted. This was the germ of what later became known as general systems theory." Inner citation is from, J. Needham, "Review of 'Theoretische Biologie,' Vol. I, by L. von Bertalanffy." *Nature* (London), Vol. 132, 1933, as cited in Bertalanffy, *History*, 24-25 and fn. 7, fn. 43; Though Hammond's *Synthesis* is an exhaustive study of GST's intellectual sources, history, and prominent figures, it is somewhat unclear on the historical confluence of Bertalanffy's 'seminal' contributions. On page 2, Hammond writes, "Bertalanffy (1901-1972) had introduced the concept of GST in 1937," but on page 111, notes, "His most important contribution to the evolution of systems thinking is the concept of the organism as an open system, introduced in 1940, which provided the basis for further work on nonequilibrium thermodynamics..." See also, "Exploring the Genealogy of Systems Thinking," page 436 where Hammond states, "[Bertalanffy] introduced the idea of a general theory of systems in a seminar at the University of Chicago in 1939." For another synopsis of systems theory's intellectual antecedents, see Kramer and Smit, *Systems Thinking*, 2-3. The authors discuss other early contributions of "what could be called a general systems theory," from German physicist Wolfgang Köhler in his book on physical 'Gestalten' and Alfred J. Lotka, a Polish born American chemist, physicist, and demographer, whom Kramer and Smit credit for introducing the concept of 'open systems' in 1925.

conceptual framework to resolve the “debates between mechanistic and vitalist conceptions of life.”<sup>42</sup>

The organismic system model proved influential among the scientific community and began to rival the Newtonian framework as a new analytical and holistic crucible for physical science and the growing social sciences. As a competing ‘paradigm,’ the organismic model was disruptive because it argued against “living organisms” as “equilibrium systems.” Rather, organismic systems theory described biological entities that could maintain “complex levels of organization” in a “non-equilibrium state” by managing entropy by the exchange of matter and energy with the environment.<sup>43</sup>

Though the knowledge gained from the Newtonian atomistic model was significant to scientific development, behavioral sciences in the post-World War II United States emphasized holistic investigative approaches, deemed better suited to the growing complexity of interdisciplinary studies in biology, psychology, technology, and sociology. Newtonian science, unlike systems theory, stressed a mechanistic epistemology with models of reducible structure and nominal interaction. Newtonian method assumes that an object’s characteristics are determined by examination of its constituent parts in relative isolation from one another. Hence, an object was scientifically understood without regard to holistic properties concomitant with interrelatedness, interdependence, or interaction between phenomena or with the object and its environment.

Another effect of the Newtonian approach on the scientific community at large was the trend towards knowledge specialization that promoted the isolation of research disciplines from

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<sup>42</sup> Hammond, *Synthesis*, 46. Hammond writes, “Vitalism is rooted in the Aristotelian concept of entelechy, the form-giving agency or force that regulates and directs the development and functioning of organisms...Vitalists, in general argue that physical and chemical laws are not adequate to explain the complex organization and seemingly purposive phenomenon of life.” Ibid., 48-49.

<sup>43</sup> Ibid., 20.

one another.<sup>44</sup> With the seminal imprint of Bertalanffy's holistic model of *organismic* systems theory, multi and interdisciplinary collaboration that emerged in the 1920s and 1930s became institutionalized in the 1950s.

In the United States, cold war concerns over the expansion of communist and totalitarian ideologies spurred alliances in the military application of industrial and technological advances with the ambitions of social science. Consequently, government and corporate research interests brought together scientists from a variety of disciplines. This led to the meeting of Bertalanffy with three systems theory's soon to be pivotal figures: Kenneth Boulding, Ralph Gerard, and Anatol Rapoport. All were fellows at the Ford Foundation's Center for Advanced Study in the Behavioral Sciences (CASBS), established in 1954.<sup>45</sup> The CASBS served as a hub of multi-disciplinary research involving academics whose "fields were dramatically affected by wartime developments in technology and management, specifically cybernetics, information theory, and operations research."<sup>46</sup> During the center's first academic year of 1954-1955, the idea was proposed for forming an official body to "to foster interdisciplinary research on a general theory of complex systems"<sup>47</sup> While the term *system* was not new and unique as an attribute of modernity, the idea of *general systems theory* is.

## POSTSTRUCTURALISM AND POSTMODERNISM—PARADOXES OF INFLUENCE

Before completing the narrative of GST's 'golden period' and later history, a brief examination of parallel intellectual developments occurring on the continents of Europe and

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<sup>44</sup> Anatol Rapoport notes, "The so-called "system approach" is often portrayed as a counter-current to the increasing fractionation of science into highly specialized branches resulting in a breakdown of communication between the specialists." Rapoport, "Preface," *General Systems Theory*.

<sup>45</sup> Hammond, *Synthesis*, 1, 6.

<sup>46</sup> Steve Heims, *Constructing a Social Science for Postwar America: The Cybernetics Group, 1946-1953*, (Cambridge, MA: MIT Press, 1991), as cited in *Synthesis*, 6.

<sup>47</sup> Hammond, *Synthesis*, 1.

America is in order. Of relevance is the advent of Structuralism, developed in the late 1920s in the works of Swiss linguist Ferdinand de Saussure; the linguist, literary theorist, and philologist Roman Jakobson; and the American semiotician and philosopher Charles Sanders Peirce.<sup>48</sup>

Saussure pioneered the scientific study of language to bring about its "systematic reevaluation."<sup>49</sup>

The significance of structuralism is inferred not only in the timing of its development and similarity of terminology but of the modes of analysis and criticism it precipitated that eventually provoked a theoretical dismissal of GST and then paradoxically provided a heuristic for GST's recent intellectual resurrection. Structuralism's inherent analytic limitations included the near to complete marginalization of historical or diachronic analysis and the conscious rejection of author and subject in favor of the text itself. Its method "focused on binary oppositions to discover overarching relationships of combination and contrast in language beyond the limit of the sentence—to that in poetry and narratives."<sup>50</sup> This method was then applied in an isomorphic fashion to semantics and social science. However, structuralist research's conclusions contradicted its very own fundamental assumptions—that the "relational and arbitrary nature of signs" abrogated the very "systematicity" of the structuralist project.<sup>51</sup>

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<sup>48</sup> Ronald Schleifer, "Structuralism," in the *Johns Hopkins Guide to Literary Theory & Criticism*, website [Online], available at [http://www.press.jhu.edu/books/hopkins\\_guide\\_to\\_literary\\_theory/charles\\_sanders\\_peirce.html](http://www.press.jhu.edu/books/hopkins_guide_to_literary_theory/charles_sanders_peirce.html), accessed 27 February 2004, 1 (as printed from the online text). Bertalanffy notes the "parallelism of general cognitive principles in different fields" such as with French Structuralism in, Ludwig Bertalanffy, *General Systems Theory: Foundations, Development, Applications* (New York: George Brazillier, 1968), xviii-xix (hereafter referred to as *GST*).

<sup>49</sup>Schleifer, "Structuralism," 1. A full treatment of the development of Structuralism is beyond the scope of this monograph but its relevance is found not only in its parallel development with and discursive similarity to GST, but in the influence of Michel Foucault's poststructural methods.

<sup>50</sup> Ibid., 2.

<sup>51</sup> Ibid., 7. "[Structuralism's]...three assumptions: the systematic nature of language, where the whole is greater than the sum of its parts; the relational conception of the elements of language, where linguistic "entities" are defined in relationships of combination and contrast to one another; and the arbitrary nature of linguistic elements, where they are defined in terms of the function and purpose they serve rather than in terms of their inherent qualities. All three of these assumptions gave rise to what Roman Jakobson came to designate as "structuralism" in 1929..."

Poststructuralism, whose appearance was logically self-evident in structuralism's original account, grew out of dissatisfaction with its predecessor's various limitations and contradictions.<sup>52</sup> French political and social disorder—the student riots and national strikes of 1968—significantly affected French intellectuals, causing some to reassess their critical orientation and intellectual mandate. One of poststructuralism's most prominent figures, French philosopher and historian Michel Foucault, who was engaged with structuralism in the 1960s, examined the relational overlapping of discourse and power structures. Foucault, never known to limit himself to any consistent “intellectual itinerary,” approached the history of ideas from a diversity of ways throughout his career.<sup>53</sup> Though his ‘methods’ are not easily susceptible to generalization, some observers have attempted to summarize Foucault's theoretical approach in order to make sense of his great influence among contemporary historians, social scientists, and Western humanities scholars. However, some interpreters note that doing so is to risk misrepresenting the intensely individual character of his works.

One consistent theme found throughout Foucault's *oeuvre* is the importance “to regard the literary text as part of a larger framework of texts, institutions, and practices...” Foucault

...urges the critic to complicate the interpretation, to reject the turn to the author's intention as the court of last resort, to look in the text for articulated hierarchies of value and meaning, above all to trace the filiations of inter- and extratextuality, to draw connections between the given text and other, between the text and the intellectual and material context. Foucauldian readings are sensitive to the political impact of the text and the political unconscious behind the text, informing its statements and shaping its lines of enunciation.<sup>54</sup>

Foucault's connection to the critique of GST is found in his dismissal of any universal theories that presuppose the possibility of a rational objectivity and a “transparency of language”

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<sup>52</sup> Ibid.

<sup>53</sup> Jerrold Seigel, “Avoiding the Subject: A Foucaultian Itinerary,” *Journal of the History of Ideas*, (1990): 273-299.

<sup>54</sup> Mark Poster, “Foucault, Michel,” in the *Johns Hopkins Guide to Literary Theory & Criticism*, website [Online], available at [http://www.press.jhu.edu/books/hopkins\\_guide\\_to\\_literary\\_theory/michel\\_foucault.html](http://www.press.jhu.edu/books/hopkins_guide_to_literary_theory/michel_foucault.html), accessed 27 February 2004, 2.

to represent things “as they are” without the introduction of “distortion.”<sup>55</sup> Foucault’s relevance to military history, theory, and doctrine is related to his work’s sensitivity toward the “political impact” and “unconscious” evident in military texts, institutions, and environments that shape its “enunciation.” One of Foucault’s methods, structuralist in origin, is *intellectual archaeology*. Like its structuralist precursor it seeks to reveal the “complexities within texts.” Foucault’s other method is *genealogy*, which is a historical or diachronic method that “attempts to reconstruct the origins and development of discourses by showing their rootedness in a field of forces.”<sup>56</sup> Taken together, both form a method to examine the “interplay between discourse and practice.”<sup>57</sup>

To gauge the influence of Foucault’s methods in historical studies, historian Gail Bederman attributes to Foucault a hypothesis that “ideas and practices comprising any discourse will be multiple, inconsistent, and contradictory.”<sup>58</sup> Despite such pronouncements and the problematic nature of *intellectual archaeology* and *genealogy*, other historians, heavily influenced by Foucault’s concern for marginalized social groups, began to reject limiting their attention to the study of Nietzsche’s signifiers and their relation to power. Gail Bederman approaches the history of ideas from a perspective allowing for “human agency and the possibility of intentional change.”<sup>59</sup> Similarly, Foucault’s influence is discernable in Deborah Hammond’s intellectual and cultural history of GST, *Towards a Science of Synthesis: The Heritage of General Theory*, cited earlier in this chapter (see note 33). Hammond’s research objectives seek a coherent evaluation of *difference* and *value* in order to recover GST’s

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<sup>55</sup> Ibid., 2. Systems thinkers are also conscious of the ‘distortions’ introduced by a scientist’s value-orientations. Interestingly, Anatol Rapoport does not believe that science can be ‘value-free.’ Rapoport, *General Systems Theory*, 34-35.

<sup>56</sup> Poster, 3.

<sup>57</sup> Ibid.

<sup>58</sup> Quoted in Thomas Bender, “Intellectual and Cultural History,” in *The New American History*, Revised and Expanded Edition, (Philadelphia: Temple University Press, 1997), 14.

<sup>59</sup> Gail Bederman, *Manliness and Civilization: A Cultural History of Gender and Race in the United States, 1880-1917*, (Chicago: University of Chicago Press, 1995) as cited in Bender, 13-14. Bender argues that Bederman’s historical methodology, “takes much that is both brilliant and useful in the work of Michel Foucault, while leaving behind that which is brilliant, but perverse and unuseful.”

misinterpreted intellectual "heritage" and identify what has been lost in discursive history and practice.

## **GST: A REVISIONIST INTERPRETATION**

Hammond examines GST's emergence and evolution through a historical narrative primarily built around the lives, work, and collaboration among five of its leading thinkers. Her analysis is set against the background of their founding of and interaction within the *Society for General Systems Research* (SGSR, now the International Society for the System Sciences (ISSS)).<sup>60</sup> Hammond explains the significance of the SGRS as a focal point in the development of systems thought in the following passage:

The SGSR emerged as part of this widespread and growing interest in the complexities of biological, social, and technological organization, and drew from this array of systems concepts in its broader philosophical concern with the social implications of the emerging systems technologies. One of the primary concerns of general systems group was to build on this perception of convergence in organizational processes toward a unity of science...The stated intention was to explore structural and functional similarities in systems at all levels of organization, seeking a kind of "general theory" of systems.<sup>61</sup>

A revisionist work, *Synthesis* examines GST's positive socio-cultural implications by reconstructing GST's "fundamental assumptions," "values" and "distinguishing aspects" marking it as unique amongst "parallel developments in systems thinking."<sup>62</sup> Hammond views systems thinking as a composite of two modes of thought, one related to the behavioral sciences and the other grouped together under engineering, technology, and management fields with systems

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<sup>60</sup> Hammond, *Synthesis*, 1-2. The five are: Ludwig von Bertalanffy, Kenneth Boulding, Ralph Gerard, James G. Miller and Anatol Rapoport. Originally called the *Society for the Advancement of General Systems Theory* in 1954, the SGRS was officially established in 1956 and was subsequently renamed the ISSS in 1988. Ibid., 1; Klir, "Preview: The Polyphonic GST," 1.

<sup>61</sup> Ibid., 2.

<sup>62</sup> Ibid., ix. See also Deborah Hammond, "Exploring the Genealogy of Systems Thinking," 430-431. This article outlines the development of Hammond's dissertation and the motivational sources for pursuing her doctoral studies; pacifism, social justice, and the search for an alternative to "mechanistic thinking" in the hopes of transforming human consciousness. These are very much in line with Foucault's ethical considerations for empowering marginalized groups.

analysis as its “dominant strand.”<sup>63</sup> Using Kramer and Smit’s categories, Hammond characterizes commonalities in systems thinking as follows: “1) Reality is regarded in terms of wholes, and 2) The environment is regarded as essential. Systems thinking habitually involves “interdisciplinary communication” to solve problems of mutual interest, arising out of various disciplines and fields of research.”<sup>64</sup>

In her analysis of works derisive of GST’s intellectual merit, Hammond attributes this disparagement to a common but narrow depiction of GST entrapped in its technically oriented modes of thinking and research interests. Philosophically and ideologically, postmodern disaffection towards any rational, positive value system and grand historical narratives with universal objective claims on knowledge has likewise assailed GST. Hammond also notes that systems thinkers themselves, in using their own terminology carelessly, have unintentionally helped obscure GST’s ethical and philosophical dimensions.<sup>65</sup>

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<sup>63</sup> Hammond, *Synthesis*, 6. In a summary of the first part of her study, Hammond provides more detail on the dual character of systems thinking, “Systems ideas emerge out of a synthesis of developments in technology, drawing on the fields of thermodynamics, information theory, and cybernetics, and closely related developments in biology, particularly ideas relating to organization and maintenance of steady states in living organisms. Perhaps the dominant strand of systems analysis can be seen as a progression from systems engineering, which deals primarily with technological systems, to management science and organizational theory, which deal with the dynamics of complex technological systems that include human individuals and social organizations.” Ibid., 14. In “Exploring the Genealogy of Systems Thinking,” 436, Hammond offers a revised perspective of “three primary orientations within the systems community...(1) Theoretical/Rational---Formal Models, Quantitative Analysis, (2) Applied/Empirical/Utilitarian---Interdisciplinary Problem Solving, and (3) Normative---Humanistic, Anti-Mechanistic.”

<sup>64</sup>Kramer and Smit, *Systems Thinking: Concepts and Notions*, as cited in Hammond, *Synthesis*, 19.

<sup>65</sup> Hammond, *Synthesis*, 111. Bertalanffy’s own unintentional complicity in GST’s being misunderstood is described by Hammond as is evidence of his explicit ethical and philosophical concerns over GST’s negative application. “Bertalanffy himself contributes to the confusion, because he often includes GST with the broader development of systems approaches, including cybernetics, information theory, game theory, systems analysis, etc. However, he also distinguishes the humanistic focus of his own approach from the more mechanistic and technocratic orientation of other contemporary approaches: ‘The humanistic concern of general systems theory as I understand it makes a difference to mechanistically oriented system theorists speaking solely in terms of mathematics, feedback and technology, and so giving rise to the fear that system theory is indeed the ultimate step towards mechanization and devaluation of man and towards technocratic society.’” Inner citation is from Ludwig von Bertalanffy, *General Systems Theory: Foundations, Development, Applications* (New York: George Brazillier, 1968), xxiii, as cited in idem, *Synthesis*, 111.



By the mid-twentieth century, the Kuhnian-like GST appeared supremely ascendant as a scientific epistemology, but during the turbulent social period of the 1960s and 1970s, perceptions of GST began to change. Academia began to seriously question GST's merit as an innovative mode of inquiry for the physical and social sciences.<sup>66</sup> Socio-cultural upheavals and the growing influence of continental philosophy and literary theory that reinforced contempt for state authority and prevalent societal values also devalued the reputation of GST and systems thinking by associating them together with the oppressive ideologies which systems thinking had been enlisted to combat. It is understandable that such criticism evolved, given the institutional relationship and collaboration between systems theorists and applied military research, but the arguments against the systems approach fail to consider its use in other areas of thinking and research.<sup>67</sup> Although in disrepute and suffering from declining interest, GST is useful in disciplines such as conflict resolution, business management, and ecological studies.<sup>68</sup>

In examination of the effects of modern (poststructuralist, postmodern) critical methods upon GST's development, Hammond subtly integrates the same postmodernist technique and argumentative tone in an attempt to confirm GST's relevancy and value for contemporary social thought. Hammond's borrowing from discursive analysis is evident over the wide range of GST research sources.<sup>69</sup> She successfully extracts GST's misrepresented and/or forgotten elements

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<sup>66</sup> Ibid., 3-5.

<sup>67</sup> Hammond, *Synthesis*, 4. Hammond writes, "The predominant conception of systems thinking within the academic community today is based on a limited understanding of the whole range of systems thought that fails to recognize the potentially progressive and liberating implications of some developments within the systems movement."

<sup>68</sup> A simplistic treatment characterizing systems thinking as "the conceptual cornerstone" of disciplines of "the learning organization" is found in Peter M. Senge, *The Fifth Discipline*, (New York: Doubleday, 1990), 69.

<sup>69</sup> Similar analytical treatments are found in recent works on military history & theory and Army leadership. John A. Lynn, a professor of history at the University of Illinois at Urbana-Champaign, admittedly co-opts postmodern critical methodology while simultaneously rebuking its intellectual currency. In his book, *Battle: A History of Combat and Culture*, (Boulder, CO: Westview Press, 2003), Lynn, "attempts to apply the basic concerns of the new cultural history without being guilty of its excesses." In doing so, Lynn borrows heavily from the ideas and terminology of two prominent postmodern

and clarifies its unique claim in intellectual history. This somewhat contradictory research method is not detrimental to her investigation as it is in keeping with the multidisciplinary approach of systems thinking. In conclusion, Hammond reveals GST's inherent qualities that are essentially sound, pluralistic, inclusive, tolerant of diversity, and concerned with sustainability. What is unsaid is that the "external" or postmodern criticism method was required and indeed *necessary* to recover GST's own holistic character.

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This chapter explored the intellectual sources and influences of GST outlining its emergence as a historically significant epistemological framework for scientific, social, and philosophical inquiry that challenged the prevailing Newtonian worldview. Yet as a "contested" concept, GST has multiple and diametrically opposed meanings for the various disciplines or groups influenced by its ideas. Research on the intellectual genealogy of GST demonstrates that, in spite of misconception and intellectual prejudice, GST as revised by postmodernist criticism provides a valid heuristic and theoretical model to examine methodological questions over

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thinkers, Michel Foucault and Edward Said. Lynn's historical and theoretical arguments are generally effective but lacking in documenting his methodological sources. Lynn does not credit Foucault and Said as would be expected while liberally employing their terminology and arguments. For example, Lynn's "discourse on war," though an oversimplification of Foucault's *discursive formations*, is employed to "bury" the mythology of the "universal soldier" which, in the current military-literary fashion, presents western warfare as inherently superior. Lynn argues for the value of military differences inherent in various cultures, aesthetics, and rituals. His critical analysis is thus pertinent to evaluating our perceptions of current national security concerns. Another example of Lynn's derivative critiques is his identification of the "orientalist" bias of writer/historians John Keegan and Victor Davis Hanson. Most cultural historians or so-called post-colonial scholars would immediately recognize the intellectual debt to the late Edward Said's seminal work, *Orientalism*.

Another example of postmodern methodological influence and 'sampling' is found in a work critical of the Army institution by Colonel Christopher R. Paparone, "Deconstructing Army Leadership," *Military Review* (January-February, 2004), 2-10. In this paper, Paparone concludes that the "Army's view of leadership is an incomplete cause-effect myth that perhaps works in combination with other environmental and social phenomena to produce effectiveness." (p. 10) Interestingly, Paparone uses the label, "The Affirmative Postmodern Method," to describe his article's research methodology. The label is thematically consistent in its simultaneous recognition of postmodernist academic efforts but wary of postmodernism's perceived corrosiveness among more traditional fields. Such a disclaimer serves as silent confession to alert readers to the intellectual rigor of the work, while at the same time conveying that the author is not bound to any controversial political or cultural baggage. To Paparone's credit, he fully documents his postmodern sources.

military decision making doctrine. In particular, GST's less well known diverse approaches to problem solving and its relevance to a "participatory model of social organization" make it a promising framework for understanding the milieu of individual and organizational conflict environments.<sup>70</sup>

The convergence of behavioral science with the advancements in "engineering, technology, and management" produced GST's valid but misunderstood legacies.<sup>71</sup> The perception of GST as a form of technocratic instrumentalism and its historical connection with military-industrial sphere is well documented but ultimately useless when GST is abstracted from the values and practice of both its adherents and detractors. However, the postmodern critique of GST is essential for the revisionist articulation of GST as a more inclusive, dialogical, and pluralistic method. Accordingly, poststructuralist doctrine reveals that any institution or idea is subject to the struggle between the corrosive effects of unchecked power and the emancipative attributes of clear thinking. The basis for a coherent understanding of the historical, social, and cultural implications of *general systems theory* is thus established and provides the context for examining a systems-based methodological approach in detail.

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<sup>70</sup> Hammond, *Synthesis*, ix.

<sup>71</sup> The connection between systems theory research and its military applications is well documented. Hammond writes, "While the CASBS was primarily aimed at bringing together scholars in the behavioral sciences, which included biology, psychology, and the social sciences, all of these fields were dramatically affected by wartime developments in technology and management, specifically cybernetics, information theory, and operations research." Hammond, *Synthesis*, 6 and n5.

## CHAPTER THREE: HARD AND SOFT SYSTEMS THINKING— TOWARD A HEURISTIC FOR DECISION-MAKING

### THE DUALITY OF GST

The history of GST's rise, rejection, and decline precipitated by socio-cultural and intellectual shifts in the latter twentieth century reveals the internal "binary opposites" of systems thinking. GST's inherent "dual" nature can be seen in its earliest articulations. This dichotomy became manifest when the ISSS community developed new research fields in response to the postmodern challenge and to systems theory's failure to serve as a prevalent scientific paradigm. A significant trend has been to "integrate the technological and social dimensions of systems thinking," resulting in the conscious differentiation between systems-based methodological approaches.<sup>72</sup> This institutional parsing created two branches of systems thinking known as 'hard' and 'soft' systems approaches. One of the earliest leading proponents of differentiating between hard and soft systems thinking is Peter Checkland, retired systems professor from the University of Lancaster, UK and former SGRS president (1986).

Checkland distinguishes between the two approaches according to their respective "attribution of systemicity." The rationale of hard systems thinking takes the "classic systems engineering methodology" worldview that posits phenomena as machine-like systems composed of 'functional' subsystems with defined purpose or objectives.<sup>73</sup> In regards to managerial decision-making this perspective views management as "decision-taking in pursuit of goals or objectives."<sup>74</sup> The systems engineering view initially influenced Checkland's thinking about the

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<sup>72</sup> Hammond, *Synthesis*, 24-25. See also Anatol Rapoport's description of GST's epistemological issues in his "attempt to integrate the analytic and the holistic, the descriptive and normative views." Rapoport, *General Systems Theory*, 1-8.

<sup>73</sup> Peter Checkland, "A Thirty Year Retrospective," in *Soft Systems Methodology in Action: A 30-year retrospective*, (Chichester, UK: John Wiley & Sons, LTD, 1999), A10 (Hereafter referred to as *TYR*).

<sup>74</sup> *Ibid.*, A6.

creation of his *Soft Systems Methodology* (SSM), but experience, experimentation, and later research led him to realize that the “complexity of human affairs” did not comport itself to the engineering-oriented systems paradigm.<sup>75</sup> This led Checkland and his colleagues to discard the traditional ‘world-as-system’ approach for a *systemic* approach to problem recognition.

## SOFT SYSTEMS METHODOLOGY (SSM):

In its mature form, soft systems thinking regards phenomena less rigidly by not viewing the world and its phenomena as integrated systems as such, that is, as objects composed of functional subsystems with discrete objectives and identifiable ‘problems to be solved’ or ‘functions to be improved.’ The soft systems approach adopts the stance where ‘systemicity’ is understood as a human way of thinking about the world while not attributing any fixed structure directly onto it (See Appendix 1, Figure 2 below). Checkland’s attribution of systemicity to soft systems thinking reflects the holism of the *I Ching*’s *systemic* view of phenomena in contrast to the hard approach of commonly held systems-based perspectives.

This contrast between systemic conceptions which focus on interrelationships and dynamic processes, and the systematic conceptions which are more concerned with order, is critical in understanding the relationship between different views of systems in the twentieth century.<sup>76</sup>

Checkland moreover examines the SGRS/ISSS and GST’s postwar history and objective of “the development of a mathematically expressed general theory of systems.”<sup>77</sup> According to Checkland, all attempts failed to achieve the dream of developing a “unity of science,” but GST’s failure did not mean failure for systems thinking. Checkland cites other areas of study, such as physical geography, systems dynamics, and understanding of autonomous living systems, where

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<sup>75</sup> Ibid., A4-A5. Checkland provides an updated synopsis of SSM’s development over the course of “30 years of research...chronicled and reflected upon since 1972 in about 100 papers and four books...” The SGRS President in 1970 noted that the hard systems approaches of systems analysis and operations research, “were oversold beyond [their] sphere of relevance.” Bertram Gross, “Systems Framework for Urban Model-Building,” *General Systems Bulletin* 2:1, cited in Hammond, *Synthesis*, 326.

<sup>76</sup> Hammond, *Synthesis*, 12.

<sup>77</sup> Checkland, *TYR*, A3

systems thinking has “flourished” in ways “not anticipated in 1954.”<sup>78</sup> Checkland’s historical assessment is another example of the divergent ways in which GST’s legacy and terminology are interpreted.

It is important to understand Checkland’s philosophical assumptions on the nature of social reality, theory, and methodology, as well as SSM’s intellectual precursors. Checkland views SSM as a descendent of the theoretical work of Geoffrey Vickers, known as “appreciative systems theory.” Vickers rejects the teleological definitions of humans and organizations as purpose driven cybernetic entities. He believes human affairs are internally directed and redirected through judgments (real, value, and action), and exist as interrelationships of daily experiences in which the “cycle of judgments and actions are organized as a system.”<sup>79</sup> Checkland differentiates between the notion of a ‘real world’ and the constructs (notations) which describe it but are not be confused with the real world. He views human perception of reality as socially constructed. The nature of social reality implied in SSM

...is the ever-changing outcome of the social process in which human beings, the products of their genetic inheritance and previous experiences, continually negotiate and re-negotiate with others their perceptions and interpretations of the world outside themselves.<sup>80</sup>

SSM assumes human beings construct and reconstruct social reality and thus social ‘reality’ can consist of many forms of purposeful activity. Reality is not a static form or function subject to explanation by natural science constructs. Another significant contribution made by Checkland are his meta-theoretical definitions of what SSM means in relation to systems thinking. SSM

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<sup>78</sup> Ibid., and Hammond, *Synthesis*, 138.

<sup>79</sup> Checkland, *TYR*, A40-A41, A50-A51.

<sup>80</sup> Peter Checkland, *Systems Thinking, Systems Practice*, (Chichester, UK: John Wiley & Sons, 1993), 283-284 (hereafter referred to as *STSP*) cited in Idem, *TYR*, A40. Checkland notes SSM’s intellectual precursors in sociology (Alfred Schultz), philosophy (Edmund Husserl), and systems thought (Geoffrey Vickers). Checkland states, “SSM can be seen as a systematic learning process which articulates the working of ‘appreciative systems’ in Vicker’s sense.”

delineates mental constructs as epistemological tools rather than as ontological literal descriptors of reality, and as mental constructs used to investigate social reality.<sup>81</sup>

With respect to orthodox GST terminology, Checkland retains two pairs of systems theoretical terms: emergence and hierarchy, and communication and control. Emergence is a term related to the common appreciation of the Aristotelian notion that the 'whole is greater than the sum of its parts' (see Chapter 2 above).<sup>82</sup> Complex entities have properties that manifest themselves at multiple levels ontologically and hierarchically. Emergence and hierarchy are the constructs that describe living organisms as holistic rather than as merely interrelated individual components. As open systems, living organisms exchange information and energy with the environment to regulate (or control) the maintenance of its hierarchy of internal processes.<sup>83</sup>

Soft Systems Methodology (SSM) was originally created to meet the complex challenges of business management. It is structured upon four concepts: (1) Modeling purposeful human activity,<sup>84</sup> (2) Redefining the nature of what a "problem" is; (3) Soft Systems Methodological inquiry as an organized *learning system*, and (4) "...models of purposeful activity can provide an entry to work on information systems."<sup>85</sup> (See Appendix 1, Figure 1 below). In this study the first three components are considered. A concise summary of SSM is provided by I. Von Bulow,

SSM is a methodology that aims to bring about improvement in areas of social concern by activating in the people involved in the situation a learning cycle which is ideally never-ending. The learning takes place through the iterative process of using systems concepts to reflect upon and debate perceptions of the real world, taking action in the real world, and again reflecting on the happenings using systems concepts. The reflection and debate is structured by a number of systemic models. These are conceived as holistic ideal types of certain aspects of the problem

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<sup>81</sup> Checkland, *STSP*, 249.

<sup>82</sup> *Ibid.*, 19.

<sup>83</sup> *Ibid.*, 74-92.

<sup>84</sup> Purposeful activity models are intellectual devices whose role is to help structure an exploration of the problem situation being addressed. Checkland, *TYR*, A21.

<sup>85</sup> *Ibid.*, A7-A9 and Hammond, *Synthesis*, 330. Hammond remarks that Checkland's work "raised the question of how to create information systems based on soft system model of human activity systems...information systems provide a point of contact between hard and soft approaches." Hence, the information systems implications of SSM 'models of purposeful activity' are relevant to DoD/Army transformation through digitization.

situation rather than as accounts for it. It is taken as given that no objective and complete account of a problem situation can be provided.<sup>86</sup>

Checkland and his colleagues' research experience suggested different ways to broaden an observer's situational understanding of human social phenomena. They did not restrict interpretation of human activity to mere "goal seeking," but interpreted 'human activity systems' as sets of linked activities which together could exhibit emergent purposefulness.<sup>87</sup> With this in mind, Checkland notes that "many interpretations of any declared 'purpose' are possible." That is, a perspective or world view must be assumed for each considered purposeful activity from which a "model will be built" as well as for providing content for that model. The number and variety of models employed will be as diverse as the interpretations of purpose they are designed to depict. There is never "one way" or a monolithic approach to depicting the nature of the situation or problem.<sup>88</sup> This leads to the re-conceptualization how a "problem" is defined.

## SSM: INQUIRY AS LEARNING

Given the diversity of abstractions from which an activity may be approached, SSM moves away from the "hard" systems doctrine which frames reality arranged in a rigid system-like manner whose solutions can be reverse-engineered once the system and its problem are identified. SSM renders the idea of "problem" as the "idea of a *situation* which some people, for various reasons, regard as problematical."<sup>89</sup> Models are considered contextual abstractions of purposeful activity rather than formal depictions of reality used to question the nature of the situation. Through such questioning in the abstract, new knowledge or understanding of the

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<sup>86</sup> I. von Bulow, "The bounding of a problem situation and the concept of a system's boundary in soft systems methodology," *Journal of Applied Systems Analysis*, 16, pg. 35-41 as cited in Peter Checkland and Jim Scholes, *Soft Systems Methodology in Action*, (Chichester, UK: John Wiley & Sons, LTD, 1990), 28 (hereafter referred to as *SSMA*).

<sup>87</sup> Checkland, *TYR*, A7.

<sup>88</sup> Ibid. A8. Checkland writes, "...because interpretations of purpose will always be many and various, there would always be a number of models in play, never simply one model purporting to describe 'what is the case.'"

<sup>89</sup> Ibid. [Emphasis in the original].



situation is gained and thus new models built in order to refine (or redefine) the questioning until the time when the process participants reach consensus “that a certain course of action [is] both desirable in terms of [the] analysis and feasible...with their particular history, relationships, culture and aspirations.”<sup>90</sup> Hence, SSM is both integrative and organized as a learning system (see Appendix 1, Figure 1 below) and answers the third criterion (Adaptability/Learning) of this monograph’s research methodology in the affirmative.

SSM’s iterative process identifies a “problem” in a less authoritative fashion by including in the analysis the values, experience, and diversity of the observer-participant(s). This method does not completely eliminate distortions or claim the capability to abstract the ‘true nature’ of any problem set in a *prima facie* sense, but it reconnects the analysis and decisions made with the values and responsibilities of the decision-maker(s). Thus, SSM is similar to the underlying critical arguments of postmodernists such as Foucault who assert similar relationships among the meanings of the language, history, and institutions that bind them in a nexus of power. Another potential advantage of SSM is that it may better resist being compromised by the corrosive effects of instrumental decision-making driven by rote process, unreflective practice, lack of analytical rigor, and rigid views of “problem solving.” If SSM is to avoid the pitfalls of instrumental approaches, its contextual reassessment must be built into the education system which chooses to promulgate its use as a decision-making methodology.

Since SSM’s advantages are related to the values and responsibility of the decision-maker/participants, such advantages depend upon the education, ethics, breadth of experience, and knowledge of those involved rather than upon the method in itself. In a word, the process is dependent upon the qualities of the leader. Another SSM characteristic is its orientation towards

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<sup>90</sup> Ibid.

the concept “of change rather than introducing or improving a system.”<sup>91</sup> Placed into an Army and joint operational context, SSM is a structurally integrative approach compatible with the synergy of battle operating systems (BOS), service functions, coalition or interagency interests, and any other domain of knowledge. SSM’s theoretical limits are the education, imagination, values, and courage of those who employ it. Conversely, SSM’s critics assert that its “participatory” nature is a fundamental weakness, as it preserves the social status quo or dominant organizational power structure.<sup>92</sup>

This research contends that SSM’s context-rich approach, while dependent upon the character and abilities of participants to be effective, implies accommodation of interests rather than consensus-seeking.<sup>93</sup> Accommodation accounts for individual and group judgments *vis-à-vis* the problem rather than non critical evaluation or assumption of naïve relativism with respect to reconciling multiple interpretations of the situation. To borrow from the imagery of the Greek Poet Archilochus, such an approach requires the talents of the fox rather than of the hedgehog.<sup>94</sup>

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<sup>91</sup> This characterization is significant for proponents of Effects Based Operations (EBO) who decry the resistance to change in how U.S. military services perceive contemporary warfare. The issue of language, perception, and change may be viewed as related to the social construction of knowledge. That is, EBO adherents view the resistance against transforming the conduct of ‘modern’ war as partly the fault of the deep-rootedness of traditional constructs of warfare that are semantically bound to the ideas of ‘conquest’ and ‘destruction.’ See Edward C. Mann, Gary Endersby, and Thomas R Searle. “Thinking Effects: Effects Based Methodology for Joint Operations,” *Cadre Paper No. 15*, (Maxwell Air Force Base: College of Aerospace Doctrine Research and Education Air University, October 2002), 13-17 and David A. Deptula, “Effects-Based Operations: Change in the Nature of Warfare” in *Defense and Airpower Series*, (Arlington, VA: Aerospace Education Foundation, 2001) [online] available at <http://www.aef.org/pub/psbook.pdf>, accessed 16 March 2004, 11.

<sup>92</sup> Hammond, *Synthesis*, 330-331.

<sup>93</sup> Checkland and Scholes, *SSMA*, 29-30.

<sup>94</sup> “The fox knows many things, but the hedgehog knows one big thing,” Archilochus frag. 201 in M.L. West, ed., *Iambi et Elegi Graeci*, vol. I (Oxford, 1971) as cited in Isaiah Berlin, “The Hedgehog and the Fox,” in *Russian Thinkers*, Henry Hardy, ed., (New York: Viking Press, 1978), 22. Berlin views this figuratively as perhaps a defining characteristic of humanity. “For there exists a great chasm between those, on one side, who relate everything to a single central vision, one system less or more coherent or articulate, in terms of which they understand, think and feel—a single, universal, organizing principle in terms of which alone all that they are and say has significance—and, on the other side, those who pursue many ends, often unrelated and even contradictory, connected, if at all, only in some *de facto* way, for some psychological or physiological cause, related by no moral or aesthetic principle; these last lead lives, perform acts, and entertain ideas, that are centrifugal rather than centripetal, their thought is scattered or

This requires an ability to synthesize the many rather than see only the one. This differentiation highlights the invaluable benefits of sound institutional education in non-military disciplines as well as education and training specifically targeted for various organizational levels. This view contends that institutions which instill the value of intellectual broad-mindedness, rigor, and freedom will produce members capable of sound critical thinking. Thus, SSM meets the definition of the second criterion (Synthesis) in this study, allowing for multi-disciplinary and integrative decision approaches. SSM is a plausible model for evaluating a joint operational environment with an action-oriented and sense-making approach to the ends-ways-means of operational and national military power.

Despite the abstract description of SSM thus far, it has been an action-oriented methodology from the outset of its development. SSM does not assume that abstraction and analysis by themselves foment change. Implementation must be methodologically accounted for. Within the context of action, cultural and political considerations and the "crucial role of history in human affairs" are recognized as critical factors in the facilitation of change.<sup>95</sup> Checkland emphasizes that SSM's development over time was not the result of academic tinkering but the consequence of lessons from its application in the field. SSM's framework of iterative contextual problem cognition and tolerance of pluralistic analysis is ultimately about decisions. However, such a framework would promote flexibility and agility in planning and decisions made through time. SSM does not promote consensus building for its own sake or to create perfect understanding and solutions. SSM action oriented character is congruent with the execution

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diffused, moving on many levels, seizing upon the essence of a vast variety of experiences and objects for what they are in themselves, without, consciously or unconsciously, seeking to fit them into, or exclude them from, any one unchanging, all embracing, sometimes self-contradictory and incomplete, at times fanatical, unitary vision. The first kind of intellectual and artistic personality belongs to the hedgehogs, the second to the foxes;"

<sup>95</sup> Checkland, *TYR*, A14-A15.

decisions required of commanders at the operational level of war. In the 1990s, SSM evolved into four definable activities:

1. Finding out about a problem situation, including culturally/politically;
2. Formulating some relevant purposeful activity models;
3. Debating the situation, using the models, seeking from that debate both
  - (a) changes which would improve the situation and are regarded as both desirable and (culturally) feasible, *and*
  - (b) the accommodations between conflicting interests which will enable action-to-improve to be taken;
4. Taking action in the situation to bring about improvement.<sup>96</sup>

## THE ART OF VISUALIZATION—RICH PICTURE BUILDING

Another of SSM's characteristics relevant to military decision-making and command and control (C2) doctrine has been the use of drawings in communicating the complexity of situations. Checkland and his team has found them "invaluable" in their field work, but warn against 'drawing for drawing's sake,' that is, forcing the formalization of literal visualization if users are not comfortable with the practice. SSM's use of picture building to assist in problem cognition is relevant to the Army operational art. Visualization is a critical metaphor in Army Battle Command doctrine. Information is conveyed by iconographic and other visual forms to depict the battlefield environment.<sup>97</sup> SSM researchers used pictorial representations of the situation to elicit comments and responses and to lead to a better understanding of the "social and cultural features of the situation."<sup>98</sup>

Thus SSM rich-picture building is a collaborative implementation of visualization in group planning and decision activity. In going beyond the Battle Command doctrine, visualization is not limited just to a commander or single individual but amenable to simultaneous and mediated problem cognition. Picture building also implies 'redrawing' or recasting of the

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<sup>96</sup> Ibid., A15.

<sup>97</sup> See "Digitization and Mission Command" in FM 6-0, *Mission Command: Command and Control of Army Forces*, August 2003, paragraphs 1-81 to 1-87.

<sup>98</sup> Checkland, *TYR*, A16.

situation in the light of new information or environmental changes. This characteristic supports this study's first criterion (Problem Definition), in parsing the modalities (or structures) of the situation from a visual stance. In other words, SSM assists users in understanding a situation by collaboratively 'seeing' process, structure, and the relations between the two.<sup>99</sup> SSM is an inherently collaborative approach, and as such it would support commanders making Execution and Adjustment Decisions in response to changing situations.<sup>100</sup> A doctrinal application of using rich picture building to enhance situational understanding is the use of logical lines of operation. (See figure 4 below). Graphical depiction of logical lines of operation is a visual technique commonly used by School of Advanced Military Studies (SAMS) educated planners for notional and actual operational planning activities.<sup>101</sup>

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<sup>99</sup> See Checkland and Scholes, *SSMA*, 28. The use of the word 'collaborative' in this study does not conform to the strict Army doctrinal definition of 'collaboration' FM 5-0 defines collaborative planning as, "...the real-time interaction among commanders and staffs at two or more echelons developing plans for a particular operation." FM 5-0, paragraph 1-80.

<sup>100</sup> FM 6-0, paragraph 6-111. Adjustment decisions are "the selection of a course of action that modifies the order to respond to unanticipated opportunities or threats. Commanders make adjustment decisions during preparation and execution."

<sup>101</sup> This evidence is based upon the author's experience in the U.S. Army School of Advanced Military Studies (SAMS) 1<sup>st</sup> year curriculum. Such visual tools were commonly applied during numerous 'practicum' exercises, special projects, and received operational briefings during the academic year 2003-2004.

## CHAPTER FOUR: SYNTHESIZING PROBLEM COGNITION

A unique characteristic of SSM that renders it appropriate for operational military decision making is its internally directed meta-examination of 'Intervention' analysis, 'Social System' analysis, and 'Political System' analysis. These three forms of analysis, known as "Analyses One, Two, and Three," respectively<sup>102</sup> are conducive to exploring the successful integration of the "Ends, Ways, and Means" of operational and strategic military problems. However, this is not a one-for-one congruence or a check list. This meta-analysis must be placed in a context of agonistic situations and relationships.

### INTERVENTION ANALYSIS AND SOCIAL AND POLITICAL SYSTEMS

#### APPRECIATION

The purpose of *Analysis One* is to examine the context and specifics of the intervention itself. It entails listing the likely 'probable owners,' selected by the 'problem solver.' This process serves as a source of ideas for selecting 'relevant systems' which might be usefully modeled.<sup>103</sup> *Analysis One* defines three roles: The 'client' or who initiated the study, the 'would-be problem solver' or who wants to take action to change the situation, and the 'problem owner.' The purpose of identifying the problem solver (or client etc.) is to align the situation with respective perceptions, knowledge, and resources. The roles of client, problem-solver, and owner are not mutually exclusive. With respect to "systems of conflict" such analysis is a starting point which encourages better situational understanding of problematic human activities by gaining more knowledge of adversarial aim(s) or relevant environmental systems.

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<sup>102</sup> Checkland and Scholes, *SSMA*, 45-51.

<sup>103</sup> *Ibid.*, 46-48.

*Analyses Two* and *Three* are social and political analyses that confront the issue of meaning, based on assumptions of socially constructed knowledge to be considered relative to ways, means, and ends for transforming the situation. This presumes 'social reality' not as a static objective phenomenon or "reified social reality," but as individuals and groups continuously constructing social meaning and structures from ideas and experience.<sup>104</sup>

*Analysis Three* uncovers the social distribution of power, focusing upon "its manifestations and the pattern of its distribution. It uses the metaphor of commodity in order to "raise discussion" on what is required to wield power in the group. This in turn is used to determine "how a culture works," to analyze what change might be feasible, and what effects might attend such change. *Analyses Two* and *Three* taken together might form the base for integrating cultural considerations into a planning and decision-making process<sup>105</sup>

In order to build conceptual models of "purposeful activity," such activity must be defined beforehand. These definitional statements, called "root definitions" describe the "core purpose of the purposeful activity system,"<sup>106</sup> and are constructed around an expression of a transformation process "T." Any purposeful activity can be expressed in this form, in which an entity (the input to the transforming process) is changed to an output (the same entity but in changed form). Checkland notes that the terms input, output, and resources are regularly

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<sup>104</sup> This distinction between a hard systems approach of the strict definition of purpose and purposeful activity are based upon theory of the social construction of knowledge.

<sup>105</sup> Untitled Research Paper (draft), (Fort Leavenworth, KS: Command and General Staff College, School of Advanced Military Studies, 2004). A survey and study of current joint and Army campaign planning doctrine conducted by the U.S. Army School of Advanced Military Studies concluded that current campaign doctrine "uniformly fails to integrate cultural considerations into campaign planning." The paper's authors developed a "Predictive Cultural analysis process," and recommended its adoption in order to assist commanders and staffs in "predict[ing] cultural responses or reactions to military operations and thereby assist in the course of action development process." The authors also claim that such a process would "ensure that cultural implications are considered throughout the planning process." [unpublished manuscript in possession of the author] Such a process is already evident within *Analyses One, Two, and Three*.

<sup>106</sup> Checkland and Scholes, *SSMA*, 33.

misunderstood or misapplied. Diligence is required to avoid model selection and naming errors. Such an example is keeping input and resources separate.<sup>107</sup>

The transformation process or T is further defined by the factors of CATWOE, a mnemonic device representing, Customers (the victims or beneficiaries of T); Actors (those who would do T); Transformation Process (the conversion of input to output); *Weltanschauung* (the worldview which makes this T meaningful in context); Owners (those who could stop T); and Environmental Constraints (elements outside the system which it takes as given).<sup>108</sup> The significance of CATWOE is the linking of the transformation process with the *Weltanschauung*. The world view provides context to the transformation process and therefore its meaning. The remainder of the components serves to consider the various actors affected in a model accommodating integrated interests. In its simplest form, CATWOE elements describe the following: do P by Q in order to contribute to achieving R, which answers the three questions: What to do (P), How to do it (Q) and Why do it (R)?<sup>109</sup> The purpose of such structural and definitional thinking in building models, "...is to ensure that there is clarity of thought about the purposeful activity which is regarded as relevant to the particular problem situation addressed."<sup>110</sup>

During the latter steps of SSM two mutually coherent characteristics come into view: The striving to facilitate 'action to improve' and the aspect of SSM as a "sense-making" approach. Both of these factors drive the process toward conclusion that Checkland describes below:

In the first (action-oriented) case the change sought can usefully be thought about in terms of structural change, process change, and changes of outlook and attitude. Normally in human affairs, any explicitly organized change will entail all three but it is common to take the easy option of imposing structural change...The second broad category of use to which SSM-style activity models

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<sup>107</sup> Checkland, *TYR*, A22

<sup>108</sup> Checkland and Scholes, *SSMA*, 35-36.

<sup>109</sup> *Ibid.*, A22-A23. The terms given in *SSMA* were XYZ rather than PQR. Cf. Checkland and Scholes, *SSMA*, 36.

<sup>110</sup> Checkland, *TYR*, A23.



can be put is to use them to make sense of complex situations (though that sense making may of course lead to action being taken).<sup>111</sup>

SSM enables users to synthesize problem cognition by accommodating a diversity of contexts in a multidisciplinary fashion. Its fundamental character as a learning strategy is its iterative process and visual techniques that show SSM as a rigorous approach to identifying problematic human activity. Having deconstructed the situation by creating root definitions, identifying a transformation process and their interrelationships through the CATWOE analysis, SSM meets the conditions for the first criterion (Problem Definition) of this study. These tools would enable SSM to offer operational decision-making with a well thought out recursive methodology to reconstruct and discern complex human activity, purposes (in a changing environment) and means (transformation processes) in seeking their varied aims.

## **ACCOUNTING FOR THE FREEDOM OF THE ADVERSARY**

While SSM was developed and applied over three decades to complex organizational activities in the private and public sectors, it is reasonable to assume (after review of the literature) that SSM may be applied to conflict phenomena. There is a danger that assumptions about SSM's applicability to conflict phenomena, which cannot be avoided, do not reduce SSM to what the father of the cybernetics Norbert Wiener described as a science battling against St. Augustine's "Manichean Devil" or a "Manichean Science."<sup>112</sup>

Peter Galison, professor of physics and science at Harvard University, has noted the parallelism between the adversarial construct of Wiener's cybernetic vision and the "agonistic aspect" of Jean-Francois Lyotard's postmodern society.<sup>113</sup> Galison argues that Lyotard misread the technical aspects of cybernetics and misunderstood the two as fundamentally incompatible

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<sup>111</sup> Ibid., A29.

<sup>112</sup> Norbert Wiener, *The Human Use of Human Beings*, (New York: Avon, 1967), 19, 50.

<sup>113</sup> Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry* 21 (Autumn 1994): 258-259. Cf. Hammond, *Synthesis*, 340.

worldviews. Moreover, Galison contends that Lyotard's postmodernism is a genealogical relative of the hard systems science whose identity and meanings were formed in World War II. Hence, it is plausible that a Clausewitzian construction of an adversarial *Other* is compatible with a postmodern approach to conflict resolution.

SSM, postmodernist theory, and conflict theory may be fundamentally related linguistically and structurally. Therefore, it is possible to assert SSM's theoretical compatibility with an *a priori* theory of warfare, while simultaneously not claiming a unitary vision of what warfare is or should be. Furthermore, hybrid or "boot-strapped" approaches are not required to attain this compatibility.

Having established the existence of an adversarial *Other*, it is a common criticism of Army planners that they neglect the fact that the enemy is free thinking and has freedom of action.<sup>114</sup> Clausewitz posits the problem of adversarial freedom in the Book One of *On War* that,

War, however, is not the action of a living force upon lifeless mass...but always the collision of two living forces. The ultimate aim of war, as formulated here, must be taken as applying to both sides. Once again, there is interaction. So long as I have not overthrown my opponent I am bound to fear he may overthrow me. Thus I am not in control: he dictates to me as much as I dictate to him.<sup>115</sup>

The lack of appreciating adversarial choice in conflict matters is noted in the Army planning doctrine as a "planning pitfall" in "using planning as scripting process."<sup>116</sup> Yet at levels beyond the tactical realm, the emergent properties of conflict must also be considered, i.e., the secondary and tertiary effects of decisions and actions in the analysis of complex activities. It is incumbent upon the problem clients, owners, and solvers alike to balance theory (models) with practice. In

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<sup>114</sup> James J. Schneider, "Vulcan's Anvil: The American Civil War and the Emergence of Operational Art," *Theoretical Paper No. 4* (Fort Leavenworth, KS: School of Advanced Military Studies, Military, 1991), 30-31. With regards to operational warfare, Schneider "define[s] operational maneuver simply as relational movement in depth that maximizes freedom of action for the destruction of the enemy's capacity to wage war." As such, "Under the new operational paradigm battles were fought to retain or deny freedom of action."

<sup>115</sup> Clausewitz, *On War*, 77.

<sup>116</sup> FM 5-0, pgs. 1-20 to 1-21. The common exhortation is that "During execution, successful commanders fight the enemy, not the plan. Plans must facilitate initiative, not constrain it."

the development of SSM, Checkland notes: "...the aim of the research process was to make neither the ideas nor the practical experience dominant..."<sup>117</sup> This process also assumes multiple levels (hierarchy) or layering of meaning as fundamental to systems thinking.

Now, the core systems image is that of the whole entity which can adapt and survive in a changing environment. So our models, to use systems insights, need to be cast in a form which in principle allows the system to adapt in the light of changing circumstances. That is why models of purposeful activity are built as sets of linked activities (an operational system to carry out the T of CATWOE) together with another set of activities which monitor the operational system and take control action if necessary<sup>118</sup>

With such assumptions, SSM's philosophical roots and process make it suitable as a military decision-making heuristic.

## **SSM AND CRITICAL THEORY: THE PROBLEM OF INSTRUMENTAL REASON**

The bane of any method is that it at once constricts its own creative application by formalizing abstract thinking and action. Beyond practice is the theoretical concern over the concept of rationality, science, power, and freedom. In practical terms, the meanings of "methodology" and "method" with respect to SSM are often misunderstood. Checkland has remarked that such misunderstanding is rife in SSM's secondary literature.<sup>119</sup> Checkland states

...methodology, properly considered, is the 'logos of method', the *principles of method*. When those principles are used to underlie, justify and inform the things which are actually done in response to a particular human problem situation, those actions are at a different level from the overarching principles. Methodology in that situation leads to 'method', in the form of the specific approach adopted, the specific things the methodology user chooses to do in that particular situation. If the user is competent then it will be possible to relate the approach adopted, the specific 'method', to the general framework which is the methodology.<sup>120</sup>

Hence, methodology is defined as a *meta-theoretical* term *concerned about* method. A method adopted as appropriate to a situation will exhibit certain characteristics. What should not be assumed is that SSM mandates a specific methodology or is a specific this or that in regards to

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<sup>117</sup> Checkland, *TYR*, A4.

<sup>118</sup> *Ibid.*, A24.

<sup>119</sup> *Ibid.*, A32.

<sup>120</sup> *Ibid.* [Emphasis in the original].

problem analysis and decision-making. Because it is SSM users who propose specific method(s) to be employed, SSM may be considered an “anarchic”<sup>121</sup> form of inquiry as it is not bound to a fixed rationale but is theoretically capable of adapting to the contingencies, complexities, and uncertainties of unfolding situations.

Another criticism concerns the domination of ideology such as the “rationality” construct over supposedly “objective” methods. How does SSM, as a descendant of the systems tradition remain independent (ideologically, semantically, and linguistically) from the so-called *systems* ideology of the scientific method, rationalism, and technology? Does SSM offer an alternative bias-free understanding of the real world without becoming another fixed method or instrumentality serving another overarching doctrine or fixed idea? Is SSM the proverbial hedgehog in the guise of a fox? How does SSM avoid the problem of form of instrumental rationality? As Checkland perceives this problem, SSM does not claim a unified vision of social reality. As previously discussed, SSM does not dogmatically apply the hard systems approach of an engineered “systems of system” world. SSM’s approach is essentially phenomenological.<sup>122</sup>

Evidence of this is that an SSM user is free to choose “relevant systems” with respect to the socially constructed situation under analysis. Critical theorists of the “Frankfurt School,” specifically Jurgen Habermas of the German Institute of Social Research, contend that cognitive freedom is illusory and necessarily subjugated by the *a priori* logic of science and technology, i.e., by the Western ideology of rationality and technological domination over nature.<sup>123</sup>

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<sup>121</sup> See the “Introduction” to Paul Feyerabend, *Against Method*, 3d Ed., (New York: Verso, 2002) for a discussion of anarchism as an “excellent medicine for epistemology” and the tyranny of method.

<sup>122</sup> Checkland, *STSP*, 278. Phenomenology is not a ‘school’ of philosophy or a strictly post-modern method of analysis. Both Kant and Hegel defined phenomenology in a narrower sense during their respective periods. Defined as an analysis of essences, contemporary phenomenology is also credited with the “placing of essences back into existence.” Joseph J. Kockelmans, “Phenomenology,” in *The Cambridge Dictionary of Philosophy*, Robert Audi, general editor (Cambridge: Cambridge University Press, 1995), 578-579.

<sup>123</sup> Jurgen Habermas, “Technology and Science as Ideology,” in David Ingram and Julia Simon-Ingram, eds. *Critical Theory: The Essential Readings*, (New York: Paragon House, 1992), 117-145.

Checkland tempers such criticism with the research of J.C. Mingers, who views SSM and the ideas of critical theory as compatible.<sup>124</sup>

Mingers concludes that Habermas as well as SSM are concerned with the problems of human nature and purposive action, that a hard systems rationality can not describe the real world (yet can be manipulated in order to foster control over it), and that the connection between rationality and values is relevant. Both critical theory and SSM address the emancipating effects of thinking with regard to understanding the nature and consequences of "social reality."<sup>125</sup> Hence, even though SSM has been described in this study with qualified assumptions based upon Clausewitz's philosophical constructs about the nature of war, SSM is by no means constrained by these 19<sup>th</sup> century conceptions.

On the other hand, a stance which is a veritable "view from nowhere" should be cognizant of its own vulnerability to relativism or hubris. Users are also cautioned about the method becoming completely divorced from reality. Users may still be susceptible consciously or unconsciously to preconceived dogma masquerading as rationality or to the despair of nihilism disguised as absolute or value-free judgment. Such dangers are more real than apparent if responsibilities and meaning are arbitrarily disconnected from the values, culture, history, and character of the participants.

## **A CRITIQUE OF INSTITUTIONAL RATIONALITY AND DECISION-MAKING**

The problems of the dual nature between theory/practice, value/judgment, etc., are likewise reflected in the military domain's art-science dichotomy, alluded to at the beginning of this monograph. With this isomorphic analogy being drawn, would not then postmodern methodologies such as those of French poststructuralism and the Frankfurt School, however

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<sup>124</sup> Checkland, *STSP*, 283.

<sup>125</sup> Ibid.

politically absurd the notion might be, perform for warfare theory what it did for GST? That is, would not such worldviews assist in clarifying operational warfare's inherent dual nature and assist in *recognizing* and coping with this inherent but contradictory condition?<sup>126</sup>

Factors conducive to postmodern examination are the U.S. military's commitment to hard systems theory, namely to operational research systems analysis (ORSA), and the DoD/Army transformation literature's dependence upon the RMA "system of systems" terminology.<sup>127</sup> An ideal growth medium for critical theory's fundamental project, i.e. the "critique of instrumental reason," are the U.S. Joint and Army doctrinal-theoretical assumptions relating to Clausewitz's axiom of the subordination of warfare to policy.<sup>128</sup> If warfare is political power's instrumental means *par excellence* to achieve stated and unstated strategic objectives, then it follows that joint and Army strategic, operational and tactical doctrine are instrumental reason *writ large* with the various service-specific task manuals as their tactical scripts.

Within the institutional setting, the military's hierarchical and constitutional obligations, economics, force structure, and readiness constraints drive the organization to fully invoke instrumental rationality. While this may be acceptable in tactical, technical, and unit training, it is to the institution's detriment in application to graduate, ethical, and moral education.<sup>129</sup> This is

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<sup>126</sup> Shimon Naveh interprets GST's formative role in modern social theory as a historiographic and hermeneutic device. Naveh describes the evolution of operational theory through the concept of "cognitive tension" which underlies the systemic dynamic in operational warfare. Naveh provides the following examples, in a manner reminiscent of literary theory, of operational warfare's intrinsic dichotomies, "Within the context of operational manoeuvre, contradictive tension can be observed in issues such as the following: tactical destruction and operation disruption; attrition and manoeuvre; the column, which expresses depth, and the front, which represents linearity; the forward nature of tactical command and the rearward nature of the operational; defensive and offensive; the culminating point and the center of gravity; and the inclination towards centralism and the relegation of authority." Naveh, *In Pursuit of Military Excellence*, 24, n23.

<sup>127</sup> For a discussion of the 'systems of systems' school of thought, see Michael O'Hanlon, *Technological Change and the Future of Warfare*, (Washington, D.C.: Brookings Institution, 2000), 11-13.

<sup>128</sup> Bohman, "Frankfurt School," 279.

<sup>129</sup> Tim Challans, "Meditations on Moral Autonomy and the Military," (Ph.D. diss., Johns Hopkins University, Baltimore, 2001). See chapter 3, "The Semi-Reflective Life: Instrumental Means." 57-109. A scathing critique of the "vocationalization" of army officer graduate level education is found in Joseph W.

not an ideological criticism but a demonstration how instrumental reason does serve a purpose in the maintenance of the “good order and discipline” of the force, and promotes tactical excellence to ensure soldiers and their units are capable of accomplishing their missions. Extending instrumentality into the operational and strategic levels of war is a fallacy that is not likely to produce successful campaigns or operational success. Tactical and technical excellence *per se* does not translate theoretically or practically into operational victory. The Army’s transformation literature in its universal application of technological instrumentalism may impact negatively Army operations, institutions, and culture.

Purely instrumental approaches often fail tragically during war, especially at the operational level or during complex operations short of “conventional war” where willful adversaries, chaos, uncertainty, and violence are unrelenting realities, occupying the same time and space where policy seeks its objectives.<sup>130</sup> At this level, decision-making which seeks to take action by rote or menu will not foresee the multiple effects of choices once made. If compounded by a flawed strategy, operational and strategic disasters lie in wait. Hence, decision-making at the operational level must not rely upon instrumental means that may serve well at the tactical level. Instrumentalism does not provide the theoretical or cognitive means to meet policy’s difficult and more than often contradictory strategic demands.

Shimon Naveh’s uses Michael Geyer’s brilliantly argued critique “German strategy in the Age of Machine Warfare, 1914-1945,” to support his thesis that the theoretical bankruptcy of the German *Blitzkrieg* caused its undoing at the hands of the theoretically coherent Soviet operational

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Ryan, *Intermediate Level Education, An Opinion*, 2003 (Unpublished manuscript in possession of the author).

<sup>130</sup> A retired four star general with over 40 years experience at all levels of command from Infantry Platoon Leader to Specified Commander, recently stated, “Given our the excellence of our soldiers and Army we may never lose another battle at the tactical level. However, we may lose the next war at the operational level. The operational level of war is complex, demanding and it is simply hard to get right.” Remarks at the U.S. Army School of Advanced Military Studies (SAMS), 2004.

art.<sup>131</sup> However, the cause of the *Wehrmacht*'s failure on the Eastern front was born out of the technocratic and opportunistic mentality of the *Wehrmacht* officer corps that had been co-opted by and brought under the control of the *Nazi* party.

The contingencies inherent in the range of military operations no longer fit existing doctrinal templates and often thwart technological advantage. Our best opportunities against any adversary depend on the physical and intellectual capabilities of soldiers and units at the point of contact and at other levels of warfare. Mid-level and senior officers are selected by virtual lottery and 'trained' by initiative robbing rote methods rather than educated. The notional problems presented to them in an integrated fashion require little intellectual rigor or risk to solve because MDMP is the institutionally mandated method. Officers taught in this manner may find it difficult to comprehend the secondary and tertiary effects of their decisions. If instrumentality is allowed to become the sole and all pervasive decision-making method, the Army institution and its members could suffer considerable long term damage to their operational effectiveness.

The merit of enlisting a revisionist GST is to freshly examine the problems inherent in operational warfare, e.g., tactics and strategy, art and science, and the dichotomy between intuition and rationality in operational decision-making. Is this also true of a critical approach to transformation policy? Postmodern analytics point out corrosive effects of the total subordination of the individual to authority and the value of differences concealed in power structures of institutions. This argument should not be ruled out on merely political grounds, as pointed out by recent military scholarship. It is also evident that critical scrutiny of the U.S. Army's

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<sup>131</sup> *In Pursuit of Military Excellence*, Chapter 4, "The Blitzkrieg Concept: A Mechanized Manipulation of Tactical Patterns."



transformation in light of military operations in Iraq and Afghanistan is showing the impact of information age theories of warfare upon military strategy and current military operations.<sup>132</sup>

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Though the sources of instrumental rationality are continuously present, a revisionist GST as embodied by SSM is an example of rationality and freedom coherently fused to enable people to understand and take action to resolve problematic situations. SSM provides a means to resolve the tensions found at the roots of operational art and provides a way for its users to recognize these dichotomies while accounting for the actions of an adversarial other. Military theorist Shimon Naveh argues that recognition of this inherent dichotomy between a system's abstract and mechanistic constituents, the "crucial condition for the functioning of consciousness-driven systems," is the *sine qua non* of the operational level of war.<sup>133</sup>

This dichotomy between the objective and universal claims of science and the problem of human subjectivity frames the debate between reductionist and philosophical (critical) approaches to the nature of conflict and war. Naveh captures the internal tension of industrial mechanized warfare, making it integral to his theory of the evolution of the operational level of war. Naveh concludes that the cognitive measures used to comprehend and interact with such phenomena should enable recognition and adaptation to this dichotomous nature. The analysis and influence of critical theory is a warning against the pervasive effect of instrumental rationality.

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<sup>132</sup> Frederick W. Kagan, "War and Aftermath," *Policy Review*. Number 120, August & September 2003. H.R. McMasters, "Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War," *Center for Strategic Leadership Student Issue Paper* Volume S03-03 (Carlisle, PA: U.S. Army War College, November 2003).

<sup>133</sup> Ibid., 6-7. Naveh writes, "In order to harmonize this dichotomy and steer the system towards the achievement of its aim while forestalling the dangers of segregation and mechanization, modes of thinking must be utilized which are entirely different from those exercised in the traditional fields of tactics and strategy. Cognitive tension and a unique intellectual creativity, characteristics of commanders at the various echelons of operational systems, is a prerequisite which can only be acquired through a scientific process of training."

Thus, decision-making theory and its relationship to the nature of warfare are subject to examination by GST in the socio-cultural theoretical context. The SSM framework resolves the primary research question and provides a model for future operational decision-making within the full range of military operations. SSM opens a path for systems thinking to stimulate innovative and creative problem solving at the operational level of war.

## CHAPTER FIVE: RECOMMENDATIONS AND CONCLUSION:

The purpose of this study was to assess the suitability of general systems theory as an approach to operational decision-making. This study also examined Army instrumentalities evident in the latter twentieth and early twenty-first century and their repercussion for operational and institutional decision-making.

Deborah Hammond's revisionist account of GST deconstructs systems theory's "fundamental assumptions," "values" and "distinguishing aspects." It dispels the monolithic characterization of systems theory as a historical artifact with technocratic latencies and reductionist rationality. Her account reconstructs GST as a "potentially progressive and liberating" mode of thinking.

A revisionist form of GST embodied in Checkland's Soft Systems Methodology (SSM) is a multidisciplinary and pluralistic planning and decision-making method that does not claim a unitary vision of the world. An examination of SSM found it acceptable as a doctrinally sound construct for future military-decision making at the operational level of war. Its success depends on the qualities and character of the leadership of its users.

Because of SSM's rigorous synthetic-cognitive analysis of cultural, social, and political factors and internal dynamics, SSM met this study's criteria for a doctrinally compatible decision-making process. Other 20th century theories, namely structuralism, semiotics, literary theory, post structuralism, and critical theory were deemed relevant because of their undeniable influence on GST and its revival as a postmodern epistemology. Their influence was examined not only in order to understand GST's historical development but also to explore the implications that *a priori* warfare theory has on decision-making doctrine and Army institutional culture.

Postmodern theory and systems theory provide insight into the urgent intellectual and educational requirements for future military planning, execution, and institutional transformation. This monograph recommends that SSM be considered for further study by the U.S. Army

Training and Doctrine Command (TRADOC) as a construct for future operational decision-making.

## **'OPERATIONALIZING' EBO: A SYSTEMS APPROACH TO URBAN OPERATIONS**

An example of a current systems-based approach to military problem solving was developed at the U.S. Army's School of Advanced Military Studies (SAMS) in 2002. This method was used to assist the U.S. Army V Corps commander and staff to analyze urban operations warfare scenarios and to 'operationalize' Effects Based Operations (EBO) planning in preparation for Operation Iraqi Freedom (OIF). This systems approach was the centerpiece of research conducted by David W. Sutherland and John W. Reynolds in their SAMS monograph, *Systems Approach to Urban Operations*.<sup>134</sup>

Although the purpose of Sutherland and Reynolds' monograph was to solve a specific operational problem associated with fighting in urban environments, the authors created, in the course of their work, a unique operational-level military problem solving method. In Chapters 3 and 4 of *Systems Approach to Urban Operations*, the authors' synthesis of systems theory, operational theory, and joint and army operational doctrine resulted in a holistic problem-solving structure that, *prima facie*, resolves the methodological dichotomy between naturalistic decision-making and rational choice methodologies *in practice*. However, the scope of their work does not address the theoretical implication of problem solving vis-à-vis the theoretical nature of conflict.

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<sup>134</sup> David W. Sutherland and John W. Reynolds, *Systems Approach to Urban Operations*. (School of Advanced Military Studies (SAMS) Monograph, U.S. Army Command and General Staff College, 2003).

Sutherland's and Reynolds' systems approach to military problem solving appears not to force planners or decision-makers to choose between distinct courses of action but rather presents the problem as an overall enemy aim (or center of gravity) represented as a complex system (or system of systems).<sup>135</sup> To counter the enemy's aims, logical lines of operation are deduced the execution of which lead to various primary, secondary, tertiary, etc. effects on the enemy's overall system and aims. Patterns may emerge within this method but are not necessarily the result of intuitive grasp or choosing between distinct courses of action but rather a result of systematic visualization or portrayal of the enemy center of gravity as a system. (see Appendix 3 below).

Even though this method exhibits characteristics of a 'hard' systems approach to problem solving, it is theoretically consistent with the Naveh's conception of "sound operational logic."<sup>136</sup> This author recommends further study of Sutherland's and Reynolds' work as a future operational decision-making approach.

## THE 21<sup>ST</sup> CENTURY META-NARRATIVE AND FUTURE WARFARE

Examining the relationship between how Army leaders plan and make decisions at the operational level of war has continually begged the question of the doctrine's relationship with the institutional Army's theoretical notions of conflict. A comprehensive study of this relationship seems long overdue. Though Army and Joint doctrine have emphasized military operational art over the past two decades, they have not reflected much over the problem of theory and its relationship to understanding future or contemporary warfare.

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<sup>135</sup> It is important to understand the difference between defining something *as a system* rather than *as if it were a system*. The former approach is indicative of a literalist or hard systems engineering orientation. See Checkland and Scholes, *SSMA*, 22

<sup>136</sup> Naveh, xiii.

The intellectual threads of this relationship appear tenuous with perceptions of how the Army is executing major combat and stability operations while simultaneously undergoing directed institutional change, designed to defeat ill-defined future threats. While policy and academic circles have rigorously reexamined the theoretical nature of the *polis* and man since 1989,<sup>137</sup> there has not been a corresponding debate over the relevance of the edifice of the modern American warfare: operational theory.<sup>138</sup>

The qualifiers that usually accompany twenty-first century warfare discussion are quickly becoming cliché: uncertainty, chaos, friction, asymmetry, terrorism, and complexity. These words and their meanings have spawned a rhetoric that the Army is failing in its contemporary operations and transformation efforts.<sup>139</sup> These criticisms also underscore the weight of strategic level decision-making and its impact upon the success or failure of military operations.<sup>140</sup>

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<sup>137</sup> Tony Judt, "America and the World," *The New York Review of Books*, [Online] Available from <http://www.nybooks.com/articles/16176>, accessed March 24, 2003. This is the second article of a three article series that examines the debate over the nature of contemporary political structure and policy whose subtext has also been a 'meta-theoretical' debate over the nature of history, man, power, and the state.

<sup>138</sup> Some may disagree with this assertion and counter that the military theoretical during the past two decades has been varied and substantial: e.g., Unconventional warfare theory, maneuver warfare theory, Effects Based Operations (EBO), Network Centric Warfare (NCW). However trivial, what readers will not find in this military literature is a substantial debate over the relevance and applicability of the "operational art" in contemporary warfare. In regard to Naveh's thesis on the evolution of operational theory this begs the question of whether "material systems conditions" still apply in the contemporary international security environment. For a historical analysis on the "trajectory of war's evolution" see Robert F. Baumann, "Historical Perspectives on Future War," *Military Review* 77, (March/April 1997), 40-49.

<sup>139</sup> See Williamson Murray, "Clausewitz Out, Computer In: Military Culture and Technological Hubris," *The National Interest*, 1 June 1997; Frederick W. Kagan, "War and Aftermath," *Policy Review*, Number 120, August & September 2003; H.R. McMasters, "Crack in the Foundation: Defense Transformation and the Underlying Assumption of Dominant Knowledge in Future War," *Center for Strategic Leadership Student Issue Paper* Volume S03-03, (Carlisle, PA: U.S. Army War College, November 2003); General Wesley K. Clark, USA (Ret.), "Iraq: What Went Wrong," *The New York Review of Books*, [Online] Available from <http://www.nybooks.com/articles/16650>, accessed 27 November 2003.

<sup>140</sup> Williamson Murray, "Innovation, Past and future," in *Military Innovation in the Interwar Period*, Williamson Murray and Allan R. Millet, eds. (Cambridge: Cambridge University Press, 1996). 305. See footnote #13 for the author's discussion of the low fault tolerance of politico-strategic judgment over the operational and tactical.

During the past two decades the unchanging thread of American military doctrine has been operational theory and operational art. The dominance of operational theory continues into the twenty-first century. Though new theories of conflict have appeared in academia, think tanks, and military journals, none seem to have questioned the theoretical supremacy of operational theory.<sup>141</sup>

This phenomenon is not without historical precedent. It may be better understood as a manifestation of prevailing societal affectations, beliefs, political economic structures, and government policy. The historian Michael Geyer's characterization of German strategy from 1914 to 1945 is foreboding.

The knowledge of war and the technique of military craft were fused together by the geopolitical conditions of Prussian Germany into a self-contained universe. Although this knowledge was expressed through the planning and conduct of military operations, it contained its own internal system of references that encompassed political assumptions about the nature of the national and international order as much as an appreciation of specific weapons....Although the German operational outlook may be called "realist," it was embedded in a strategic framework that was derived from the idealistic philosophy about war and the state in the early nineteenth century.<sup>142</sup>

The Air Force's Effects Based Operations (EBO) seems the most promising candidate to alter the balance of theories (or lack thereof) because its proponents offer innovative linguistic arguments and other non-traditional constructs such as contextual-planning as alternatives to perceived status-quo views on land warfare. EBO adherents critique other theoretical approaches using language neutral arguments rather than land warfare terminology which they feel hinders EBO's application.

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<sup>141</sup> One notable exception to this trend is Roger Spiller's, *Sharp Corners: Urban Operations at Century's End*. Fort Leavenworth, KS: U.S. Army Command and General Staff College Press, 2000.

<sup>142</sup> Michael Geyer, "German Strategy in the Age of Machine Warfare, 1914-1945," in *Makers of Modern Strategy*, Peter Paret, ed. (Princeton: Princeton University Press, 1986), 527. Clausewitz elucidated the context of the "total phenomenon" of war and "its dominating tendencies" as "trinity" and implies that its balance is precarious. Clausewitz, *On War*, 89.

## DOCTRINE, EDUCATION AND ITS DISCONTENTS

Critical reasoning, creative thinking, ethical reasoning, and reflective thinking are facets of the conceptual skill that Army leaders must “know.”<sup>143</sup> (see Appendix 4 below) Methodological actions that leaders must “Do” consist of influencing, operating, and improving.<sup>144</sup> Field Manual 22-100, *Army Leadership*, lists decision-making as a sub-set of *influencing* action(s) while planning/preparing, executing, and assessing constitute *operating* action. Army organizational and strategic level leaders must “know” and “do” these leadership skills and actions respectively, as well as comport themselves with other leadership abilities commensurate with their positions in the organizational hierarchy. FM 22-100 states that The Military Decision Making Process (MDMP) is a methodology that enhances decision-making and planning “during tactical operations” for “organizations with staffs.”<sup>145</sup>

In light of the DoD and the Army transformation, do leader attributes and characteristics of Future Force commanders and staffs warrant change to standing military decision-making process doctrine? Based upon current operations, the answer is yes. An institution’s ability to adapt and successfully thrive in new environments amongst uncertain threats is a function of its membership’s ability to think critically at the individual and social-group level. However, intelligent adaptation presumes some level of consciousness that can discern the value of worthwhile concepts, behaviors and techniques within a context of what warfare is or becoming. Such flexible behaviors are inculcated through institutional values and imprinted upon its members by cultural and educational processes.

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<sup>143</sup> Department of the Army, Field Manual 22-100, *Army Leadership*, 31 August 1999. pg 2-24 to 2-25 and pg 4-6 to 4-10.

<sup>144</sup> Ibid., pg 5-1. See chapter 1 for a detailed explanation of the Army Leadership Framework and Appendix 1 of this paper for a graphical depiction of the framework.

<sup>145</sup> Ibid., pg. 5-3



A military organization's decision-making agility is also a reflection of its personnel management system, selection process and education system. If such systemic functions promote risk aversion, cronyism, and anti-intellectualism, then dysfunctional organizations are the norm where technocratic values thrive. In such environments personal innovation is muted if not systematically discouraged. If personnel systems and education are the 'invisible hands' of institutional change, then we need to look there first and with critical eyes to see where future possibility lies. This also implies change to appropriate joint professional military education (JPME) standards and Army officer intermediate level education (ILE). An officer's impression of the ILE initiative notes:

The second assumption of ILE - that an integrated curriculum and team teaching make for a good education - is highly problematic. Civilian universities and high schools experimented with these approaches in the sixties and seventies, and quickly abandoned them. They found that team teaching led swiftly to "groupthink" among their faculties, and that integrated curriculums infantilized their students.<sup>146</sup>

These normative recommendations recognize that institutional change should not be driven by radical material and cultural transformation or slogans implied in uncritically accepted warfare theories or problematic aspects of foreign policy (within the parameters of the military's constitutional responsibilities).<sup>147</sup> Change is accumulated through the intellectual discourse between and within the institution's membership and audience whose experiences are informed by the social and multidisciplinary nature of conflict.<sup>148</sup>

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<sup>146</sup> Joseph W. Ryan, *Intermediate Level Education, An Opinion*, 2003 [Unpublished manuscript in possession of the author]. Ryan elaborates further, "The world does not present itself in an integrated fashion, and actors on the world's stage rarely read from the same script. Why then, would an educational institution present to their students what is essentially a cartoon? If students do not learn to use their imaginations to prioritize and make connections in school, where will they learn to do so?"

<sup>147</sup> Jeffrey Record, *Bounding the Global War on Terrorism*, (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2003). From the forward: "Dr. Jeffrey Record examines three features of the war on terrorism... (1) the administration's postulation of the terrorist threat, (2) the scope and feasibility of U.S. war aims, and (3) the war's political, fiscal, and military sustainability. He finds that the war on terrorism—as opposed to the campaign against al-Qaeda—lacks strategic clarity, embraces unrealistic objectives, and may not be sustainable over the long haul. He calls for down-sizing the scope of the war on terrorism to reflect concrete U.S. security interests and the limits of American military power."

<sup>148</sup> Lynn, *Battle: A History of Combat and Culture*, xiv-xxv.

## CONCLUSION

By reviving the notion of the social nature of warfare with a systemic reevaluation of the limitations of technology and the character of the defense institution itself, some balance may be restored to counter the dominance of instrumental rationality. Officer education appears to be a place to start. The debate over the future of decision-making proceeds from here. Any decision-making methodology that is brought to bear on doctrine should be examined rigorously by the institution's educational and doctrinal-theoretical establishments. Among the duties of the Army's educational institutions belongs critical reflection upon the military's primary activities: execution of policy and war. A tendency to disconnect the theory of warfare from the practice of military decision-making is not a mere failure to learn from history. It could become the Army's heel of Achilles.

The best that can be done, as a general rule, is to maintain a precarious equilibrium that will prevent the occurrence of desperate situations, of intolerable choices— that is the first requirement for a decent society; one that we can always strive for, in the light of the limited range of our knowledge, and even of our imperfect understanding of individuals and societies. A certain humility in these matters is very necessary.<sup>149</sup>

Correcting at least some identifiable flaws in any social institution such as the Army is a never completed task. This monograph attempts to address at least one such problem.

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<sup>149</sup> Isaiah Berlin, "The Pursuit of the Ideal," in *The Crooked Timber of Humanity*, Henry Hardy, ed. (New York: Alfred A. Knopf, 1991), 17-18.

## APPENDIX 1: CHECKLAND'S SOFT SYSTEMS METHODOLOGY

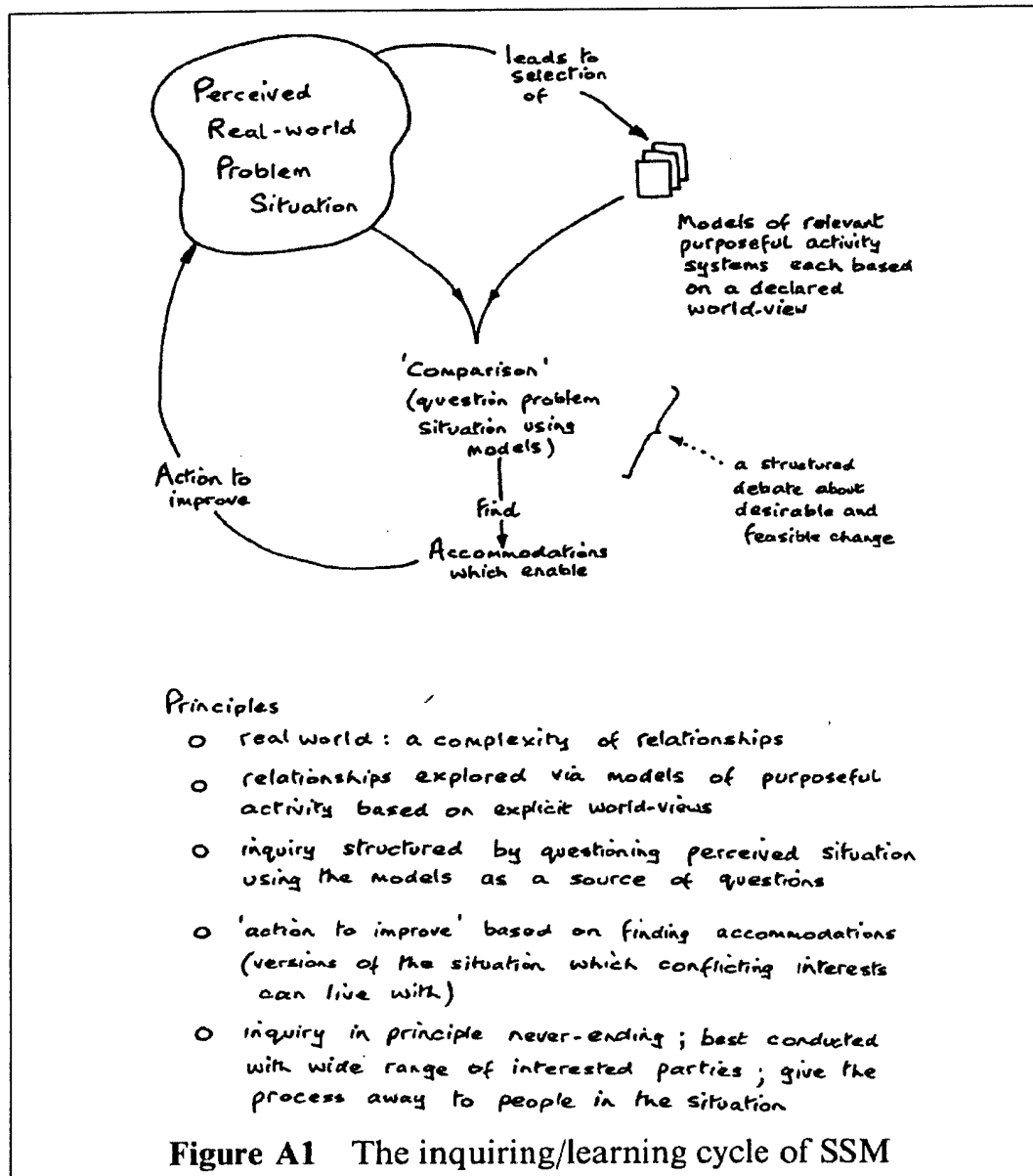


Figure 1: Checkland's inquiring/learning cycle of SSM<sup>150</sup>

<sup>150</sup> Checkland, TYR, A9.

## THE HARD AND SOFT SYSTEM STANCES

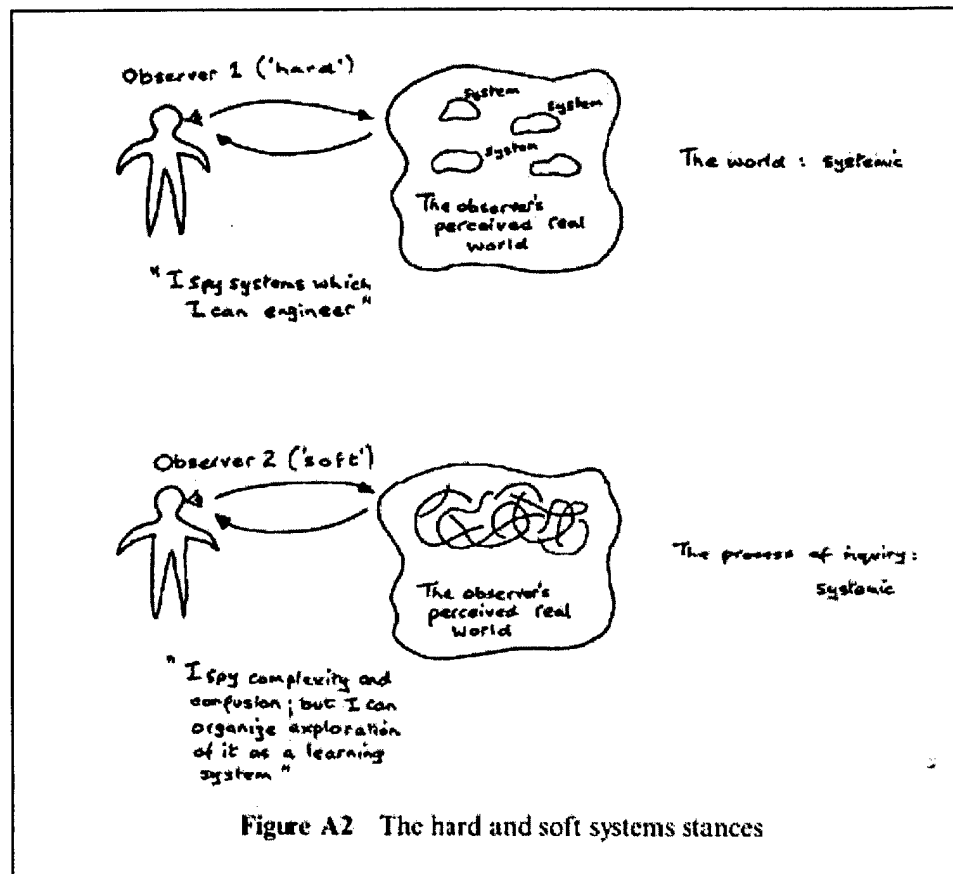


Figure 2: The hard and soft systems stances<sup>151</sup>

<sup>151</sup> Ibid., A11.

## THE PROCESS OF SSM

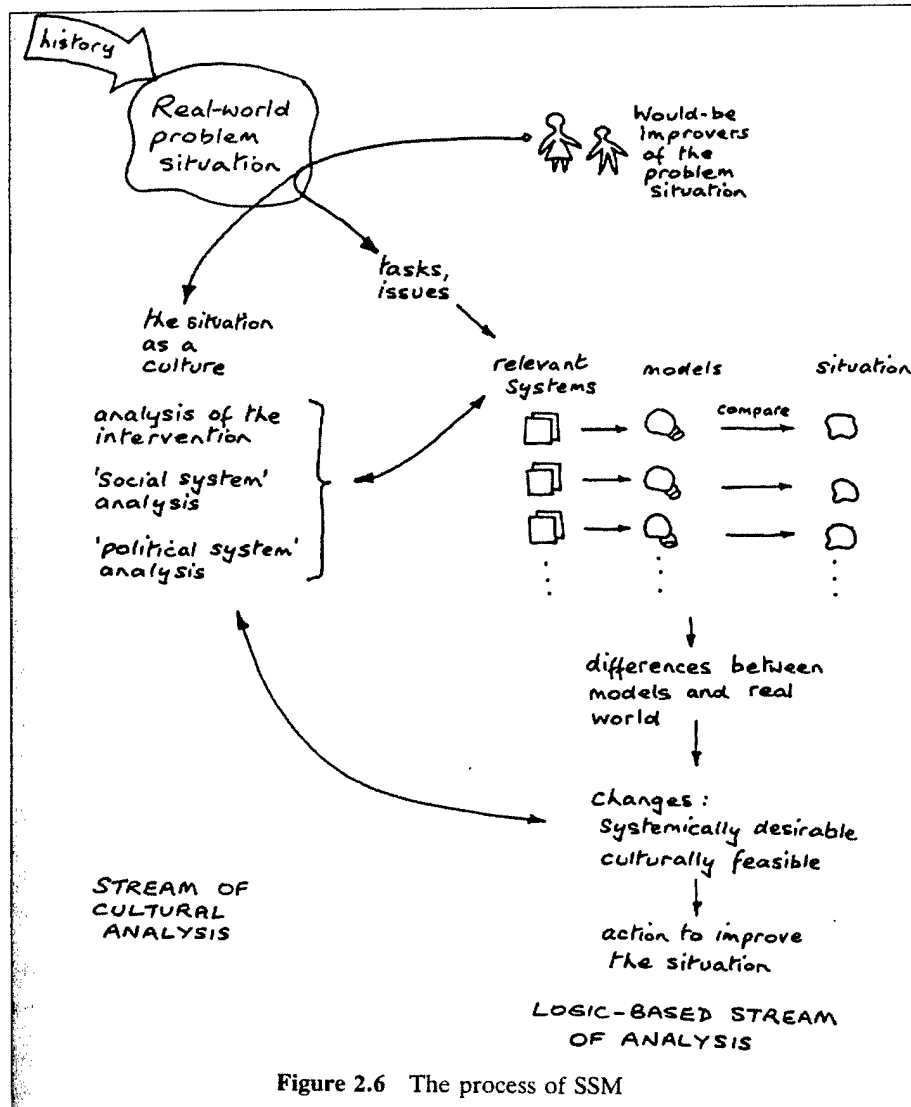


Figure 2.6 The process of SSM

Figure 3: The Process of SSM<sup>152</sup>

<sup>152</sup> Checkland and Scholes, *SSMA*, 29.

## SYSTEMS THINKING AND SOFT SYSTEMS METHODOLOGY (A

### SUMMARY)<sup>153</sup>

- (1) Systems thinking takes seriously the idea of a whole entity which may exhibit properties as a single whole ('emergent properties'), properties which have no meaning in terms of the parts of the whole.
- (2) To do systems thinking is to set some constructed abstract wholes (often called 'systems models') against the perceived real world in order to learn about it. The purpose of doing this may range from engineering (in the broad sense of the word) some part of the world perceived as a system, to seeking insight or illumination.
- (3) Within systems thinking there are two complementary traditions. The 'hard' tradition takes the world to be systematic; the 'soft' tradition creates the process of enquiry as a system.
- (4) SSM is a systemic process of enquiry which also happens to make sue of systems models. It thus subsumes the hard approach, which is a special case of it, one arising when there is local agreement on some system to be engineered.
- (5) To make the above clear it would be better to use the word 'holon' for the constructed abstract wholes, conceding the word 'system' to everyday language and not trying to use it as a technical term.
- (6) SSM uses a particular kind of holon, namely a so-called 'human activity system.' This is a set of activities so connected as to make a purposeful whole, constructed to meet the requirement of the core system image (emergent properties, layered structure, processes of communication and control).
- (7) In examining real-world situations characterized by purposeful action, there will never be only one relevant holon, given the human ability to interpret the world in different ways. It is necessary to create several models of human activity systems and to debate and so learn their relevance to real life.

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<sup>153</sup> Checkland and Scholes, *SSMA*, 25-26.

## APPENDIX 2: LOGICAL LINES OF OPERATIONS (FM 3-0)

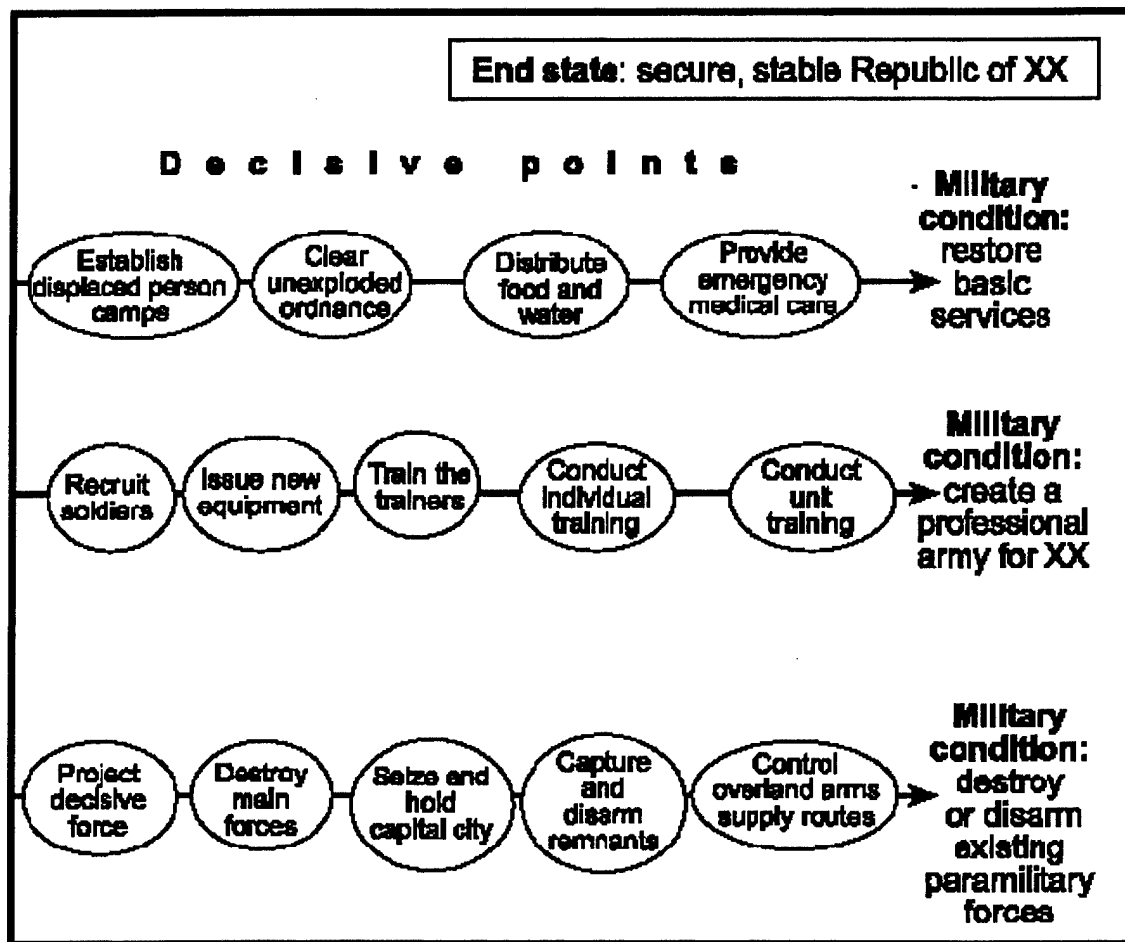


Figure 5-3. Logical Lines of Operations

Figure 4: Logical Lines of Operations (FM 3-0)<sup>154</sup>

<sup>154</sup> FM 3-0, *Operations*, paragraph 5-37. "When positional reference to an enemy or adversary has little relevance, commanders may visualize the operation along logical lines (see Figure 5-3). This situation is common in stability operations and support operations. Commanders link multiple objectives and actions with the logic of purpose—cause and effect. In a linkage between objectives and forces, only the logical linkage of lines of operations may be evident. Multiple and complementary lines of operations work through a series of objectives. Commanders synchronize activities along multiple lines of operation to achieve the desired end state. Logical lines of operations also help commanders visualize how military means can support nonmilitary instruments of national power."

## APPENDIX 3: SYSTEMS APPROACH TO URBAN OPERATIONS DIAGRAMS

### SYSTEMS IN A CITY

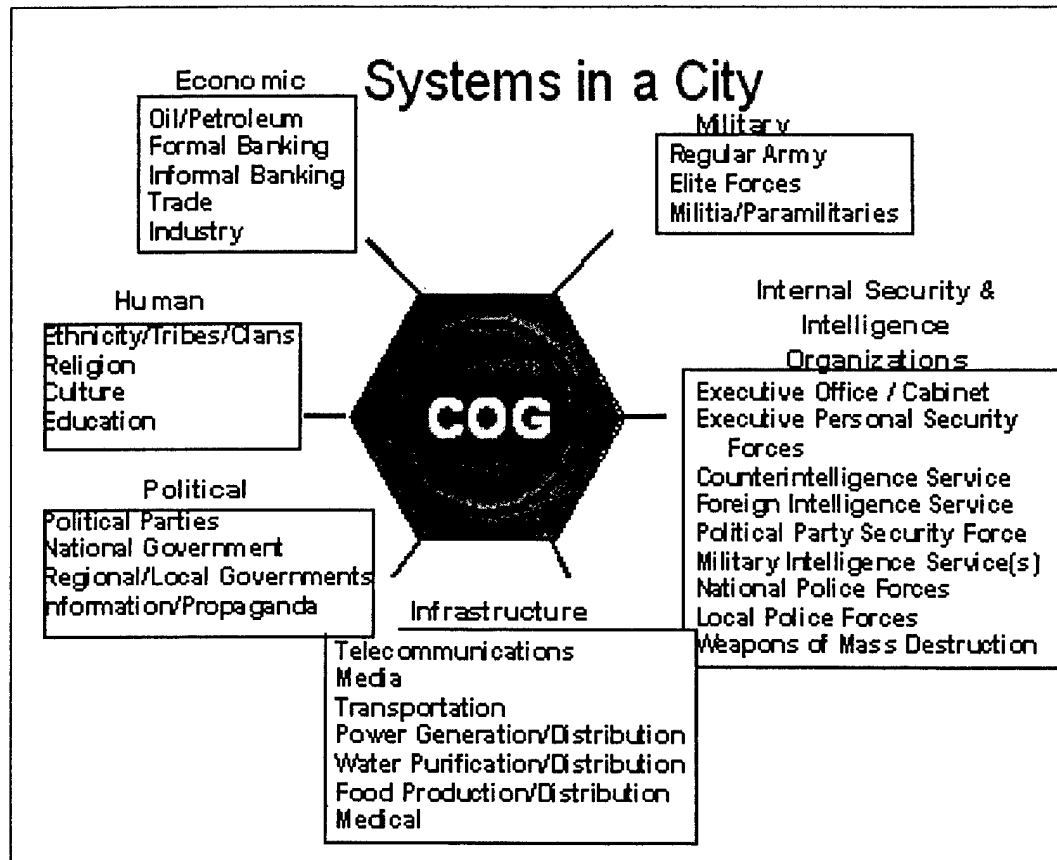


Figure 5: Systems in a City<sup>155</sup>

<sup>155</sup> David W. Sutherland and John W. Reynolds, *Systems Approach to Urban Operations*, School of Advanced Military Studies (SAMS) Monograph, (Leavenworth, KS: U.S. Army Command and General Staff College, 2003), 31.



## SYSTEM DEFINED

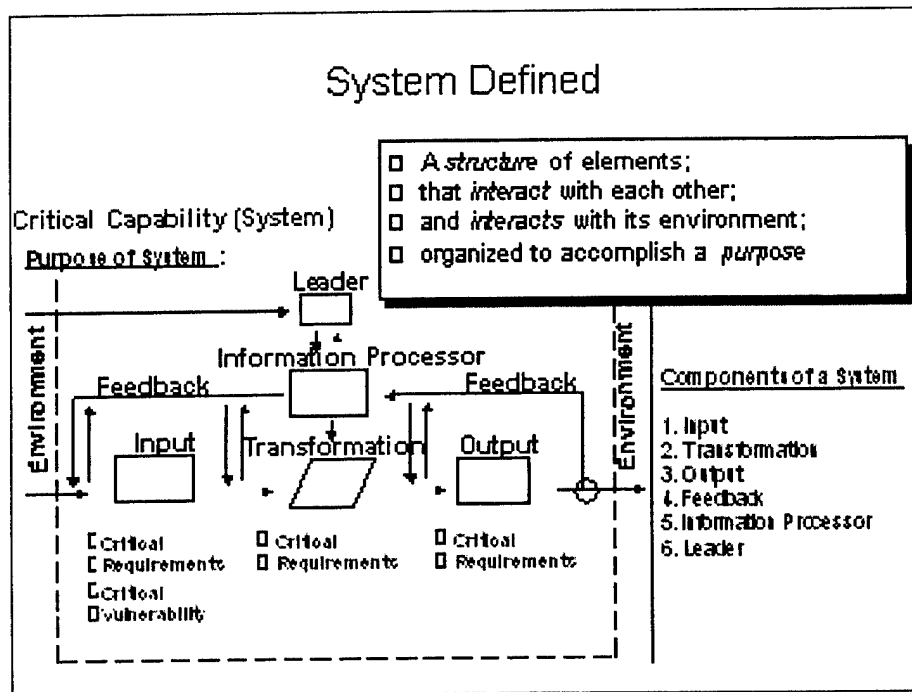


Figure 6: System Defined<sup>156</sup>

<sup>156</sup> Ibid., 43.

## SYSTEM WORKSHEET (POWER GENERATION/DISTRIBUTION)

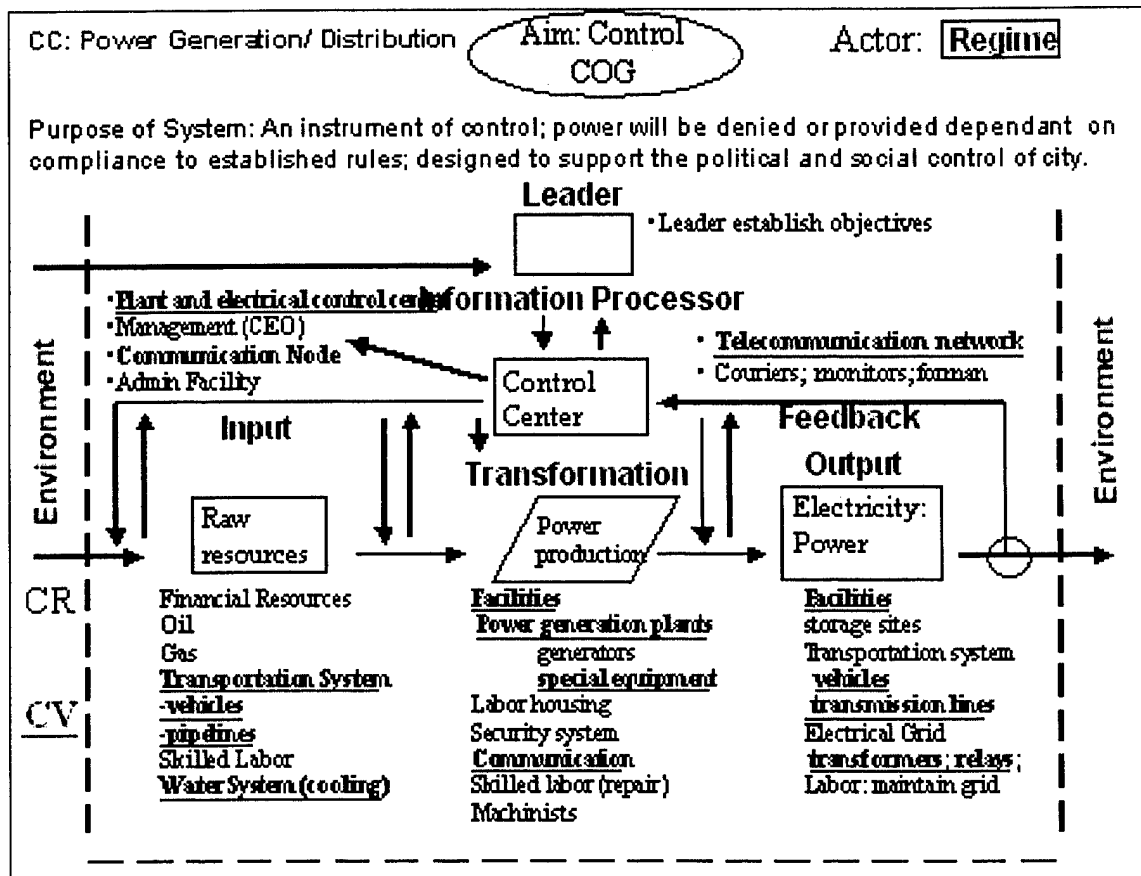


Figure 7: System Worksheet (Power Generation/Distribution)<sup>157</sup>

<sup>157</sup> Ibid., 38.

## LOGICAL LINES OF OPERATION

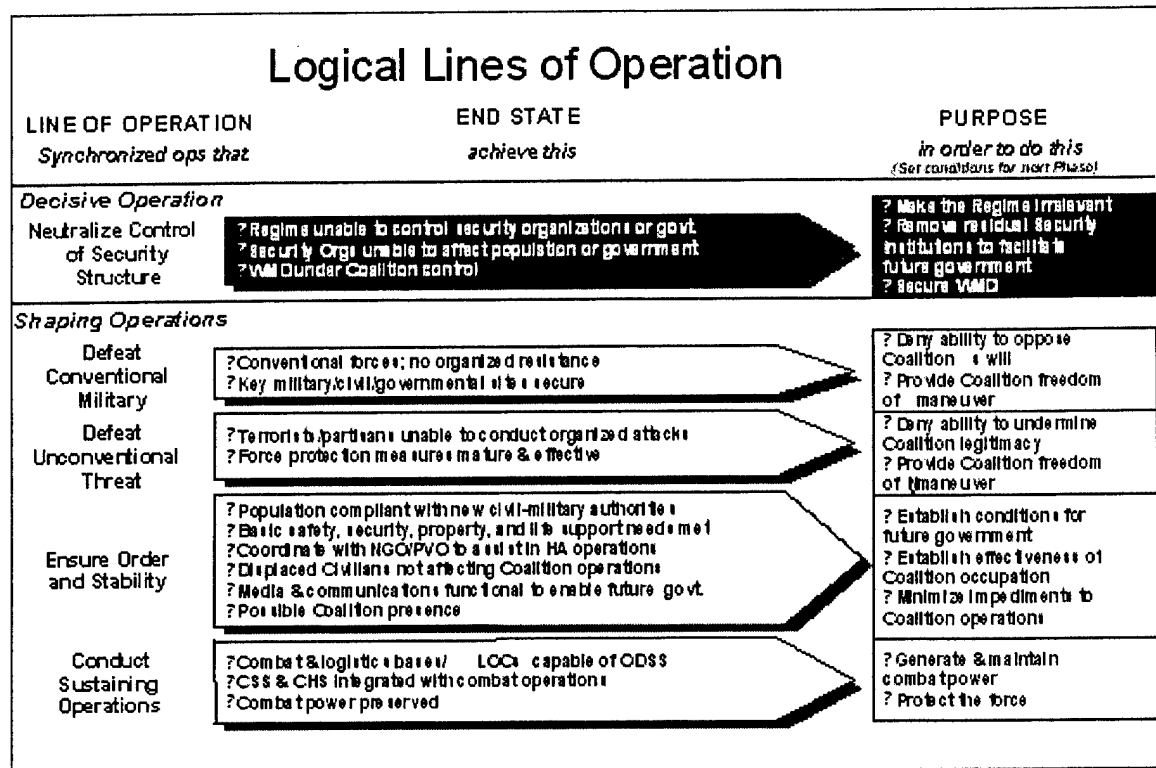


Figure 8: Logical Lines of Operation<sup>158</sup>

<sup>158</sup> Ibid., 46.

## LINES OF OPERATION AND DECISIVE POINTS

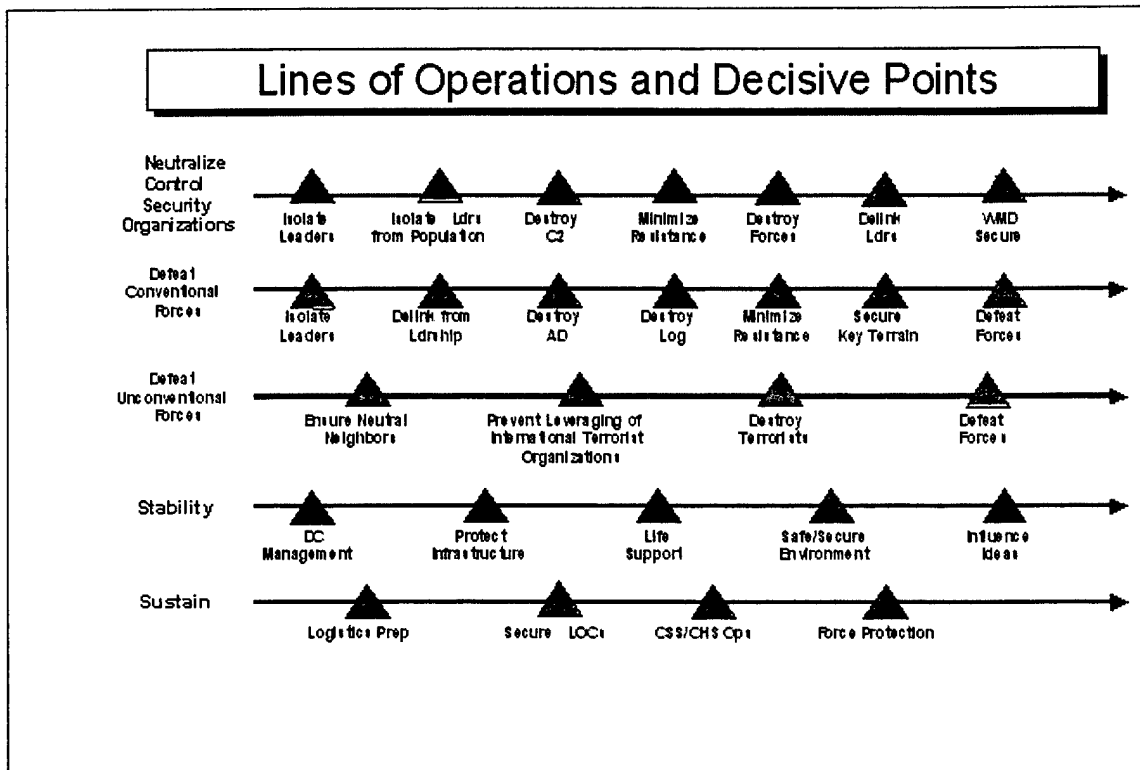


Figure 9: Lines of Operation and Decisive Points<sup>159</sup>

<sup>159</sup> Ibid., 47.

## WARGAMING EXTRACT

<div>Wargaming Extract</div> <div>Effects of Seizing Key WMD Sites</div>		
System	2 <sup>nd</sup> Order Effect	3 <sup>d</sup> Order Effect
Weapons of Mass Destruction Program	Leadership relocates remaining WMD to prevent seizure by Coalition	Regime prevents Coalition seizure of remaining WMD (using CCD); Regime employs remaining WMD
	Leadership employs remaining WMD (use or lose)	follow-on use more likely; increased sympathetic terrorist attacks against Western targets globally
Leadership Political Organization	Leadership has incentive for preemptive employment of remaining WMD	Leadership employs WMD; Party loses long-term legitimacy; Coalition cohesion & commitment increased
Conventional Military Operations	Confidence & morale degraded w/ loss of WMD combat multiplier	Forces relocate into city to mitigate force ratio overmatch; conducts isolated CATKs to regain sites
Medical Capacity	Inadvertent release of NBC during Coalition seizures causes MASCAL	Consequence management system overloaded; Leadership IO attacks Coalition operations
Trade & Black-Market	Loss of control of WMD sites (prior to Coalition seizure) leads to black-market smuggling of WMD	Smuggled WMD proliferated among sympathetic terrorist organizations & hostile state/sub-state/non-state actors

Figure 10: Wargaming Extract<sup>160</sup>

<sup>160</sup> Ibid., 51.

## TARGET LINKAGE

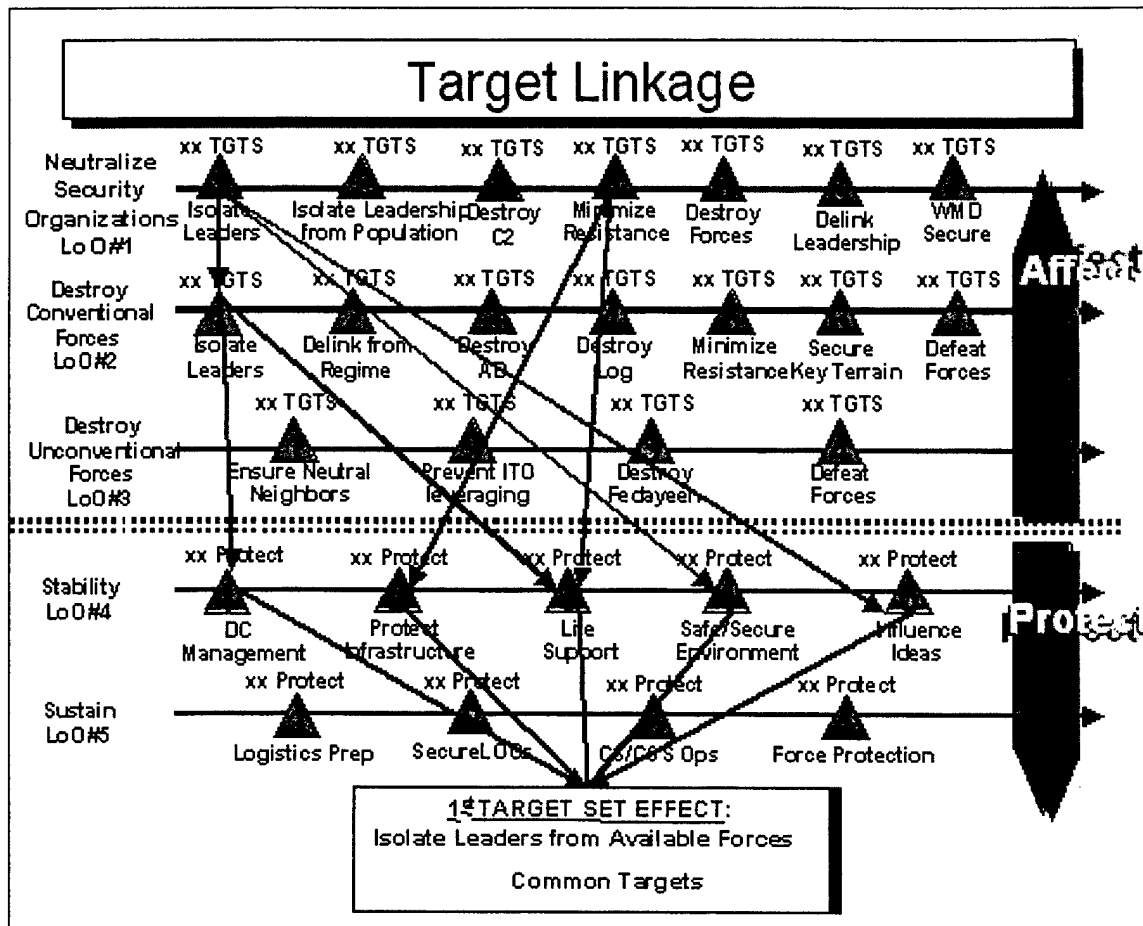


Figure 11: Target Linkage<sup>161</sup>

<sup>161</sup> Ibid., 54.

## APPENDIX 4: THE ARMY LEADERSHIP FRAMEWORK

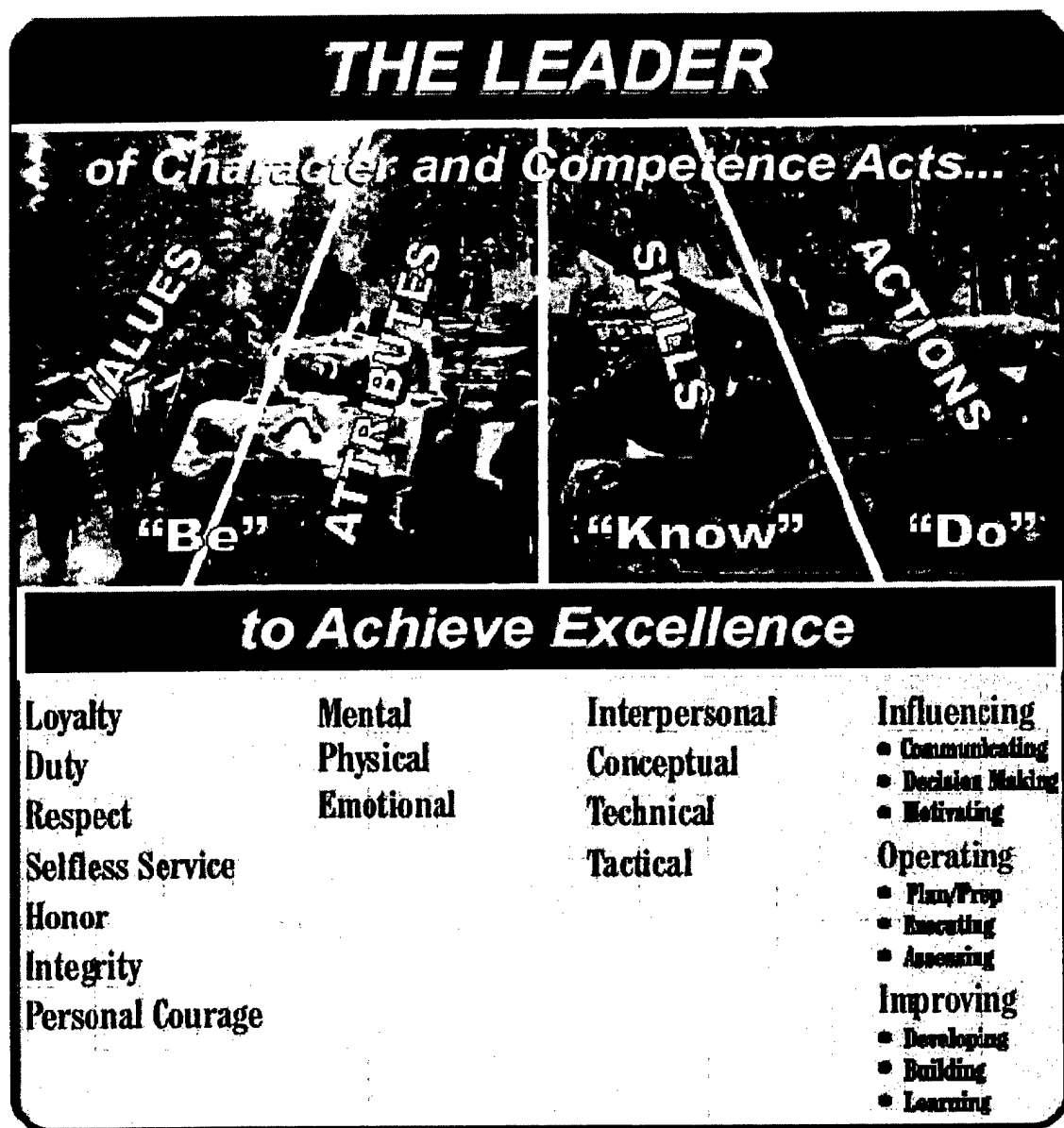


Figure 12: The Army Leadership Framework<sup>162</sup>

<sup>162</sup> FM 22-100, *Army Leadership*, page 1-3.

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